MUTHAYAMMAL ENGINEERING COLLEGE

(An Autonomous Institution)

(Approved by AICTE, New Delhi, Accredited by NAAC & Affiliated to Anna University)
Rasipuram - 637 408, Namakkal Dist., Tamil Nadu.

Department of Electrical and Electronics Engineering
Question Bank - Academic Year (2019-20)

Course Code & Course Name : 19EEC07 & Power Electronics

Name of the Faculty : Dr.R.Sagararaj

Year/Sem/Sec : III/V/B

Unit-I: POWER SEMICONDUCTOR DEVICES

Part-A (2 Marks)

1. Why IGBT is very popular nowadays?
2. What are the different methods to turn on the thyristor?
3. IGBT is a voltage controlled device. Why?
4. Power MOSFET is a voltage controlled device. Why?
5. How can a thyristor turned off?
6. Define latching current
7. Justify, the necessity of snubber circuit
8. Why circuit turn off time should be greater than the thyristor turn-off time?
9. What is the turn-off time for converter grade SCRs and inverter grade SCRs?
10. Mention some of the applications of controlled rectifier.

Part-B (16 Marks)

1.	Explicate the structure and operation of turn on and turn of characteristics of SCR	(16)
2.	Discuss the transfer, output and switching characteristics of IGBT.	(16)
3.	Describe the operation of power MOSFET and explain the transfer, output and switching characteristics of power MOSFET.	(16)
4.	Enlighten the operation of driver and snubber circuits for power MOSFET.	(16)
5.	Explain with diagram the various modes of working of TRIAC	(16)

Unit-II : AC - DC CONVERTERS

Part-A (2 Marks)

1. Function of freewheeling diodes in controlled rectifier
2. List the advantages of freewheeling diodes in a controlled rectifier?
3. What is meant by delay angle?

4. Merits of single phase bridge converter over single phase midpoint converter?
5. Justify, the commutation angle or overlap angle
6. Mention the different methods of firing circuits for line commutated converter?
7. Give an expression for average voltage of single phase semi converters.
8. Write down the expression for average output voltage for step down chopper.
9. What is meant by step-up and step-down chopper?
10. Write down the expression for average output voltage for step up chopper.

Part-B (16 Marks)

1. With necessary circuit and waveforms, explain the principle of operation of three phase controlled bridge rectifier feeding R-L load and derive the expression for the average output dc voltage. (16)

2. Clarify the working of single phase dual converter with circuit diagram and waveforms. (16)

3. Explain the effect of source inductance in the operation of three phase fully controlled converter, indicating clearly the conduction of various thyristors during one cycle with relevant waveforms. (16)

4. Enlighten the operation of three phase half wave controlled converter with inductive load. Sketch the associated waveforms. (16)

5. Explain the operation of three phase dual converter with circulating and non circulating current type. (16)

Unit-III : DC - AC CONVERTERS

Part-A (2 Marks)

1. Why diodes should be connected in antiparallel with the thyristors?
2. Which types of inverters require feedback diodes?
3. What is the condition to be satisfied in the selection of L and C in a series inverter?
4. List out the applications of a series inverter?
5. How is the inverter circuit classified based on commutation circuit?
6. What are the applications of a CSI?
7. Mention the advantages of PWM control?
8. How the harmonic to be reduced?
9. What are the applications of ac voltage controllers?
10. Write down the two methods of control in ac voltage controllers?

Part-B (16 Marks)

1. Explain the principle of operation of 3 phase voltage source inverter with 180˚conduction mode with necessary waveforms and circuits. Also obtain the expression for line to line voltage. (16)

2. Discuss the functioning of three phase voltage source inverter in 120 degree operating mode with relevant waveforms and obtain the expression for voltages. (16)

3. Explain the different methods of voltage control adopted in an inverter with suitable waveforms. (16)

4. Describe the working of a single phase full bridge inverter supplying R, RL loads with relevant circuit and waveforms. (16)

5. What is the need for controlling the output voltage of inverters? Classify the various techniques adopted to vary the inverter gain and brief on sinusoidal PWM. (16)

Unit-IV : DC to DC Converter

Part-A (2 Marks)

1. Why thyristors are not preferred for inverters?
2. List the types of control strategies?
3. What is meant by TRC?
4. Give the details of PWM control in dc chopper
5. Write down the expression for the average output voltage for step down chopper.
6. Mention the different types of chopper with respect to commutation process?
7. Merits of current commutated chopper
8. List the applications of an inverter
9. What are the main classifications of inverter?
10. How output frequency is varied in case of a thyristor?

Part-B (16 Marks)

1. Draw the circuit diagram of buck regulator and explain its working principle with necessary waveforms. Derive the expression for peak to peak ripple voltage of the capacitor that is present across the load. (16)

2. Describe the working principle of boost converter with necessary circuit and waveforms. (16)

3. Discuss the working principle of buck-boost converter with necessary circuit and waveforms. (16)

4. Explain zero voltage switching resonant converters. (16)

5. Clarify and explain the various control strategies of chopper (16)

Unit-V : AC to AC Converters
Part-A (2 Marks)

1. Difference between ON-OFF control and phase control
2. What is the duty cycle in ON-OFF control method?
3. Control range of firing angle in ac voltage controller with RL load
4. Which type of gating signal is used in single phase ac voltage controller with RL load?
5. Short notes on sequence control of ac voltage regulators?
6. What is meant by cyclo-converter?
7. List out the applications of cyclo-converter?
8. What is meant by negative converter group in a cyclo converter?
9. Mention the different types of chopper with respect to commutation process?
10. Merits of current commutated chopper

Part-B (16 Marks)

1. Draw the circuit diagram of three phase to single phase cycloconverter and explain its operation with waveforms (16)

2. Describe the operation of single phase full wave AC voltage controller with the help of voltage and current waveform. Also derive the expression for average value of output voltage. (16)

3. With aid of circuit diagram, explain the operation of three phase to three phase cycloconverter employing three phase half wave circuits and list few of its applications. (16)

4. Discuss the working of a single phase AC voltage controller with RL load when its firing angle is more than the load power factor angle. Illustrate with waveforms. (16)

5. With the necessary circuit diagram and waveforms, explain the principle of operation of single phase ac voltage controller having only thyristor feeding resistive load by on-off control and phase control. Derive the expression for rms value of output voltages in both cases. (16)

Course Faculty **HoD**