

Duration: 3hrs

[Max Marks: 80]

- Note: 1) Question No. 1 is compulsory
2) Attempt any three questions out of remaining five
3) All Questions carry equal marks
4) Assume suitable data if required and state it clearly

- Q1 Attempt any **FOUR** [20]
- a. Give comparison between power MOSFET and IGBT 5
 - b. Explain “Sin PWM” control of inverters. 5
 - c. Explain SOA of MOSFET with appropriate diagrams 5
 - d. What is significance of free-wheeling diode, explain with one example and waveforms. 5
 - e. What is a bootstrap driver circuit? Why it is needed? 5
- Q2.a) Explain with circuit diagram and waveform, 3-phase bridge inverter for 180 degree conduction mode. [10]
- b) Explain the Dynamic characteristics of SCR with appropriate waveforms. [10]
- Q3. a) What is commutation technique? Why it is needed? Differentiate between voltage and current commutation with example. [10]
- b) Explain 3-phase full converter with circuit diagram and draw following waveforms for firing angle $\alpha=30^\circ$: 1. Supply voltage 2. Firing pulses 3. Load voltage. And 4. Load current [10]
- Q4. a) Draw single phase fully controlled bridge converter with R-L load. Explain its operation with appropriate waveforms. [10]
- b) Explain with suitable diagram the different Gate –Triggering techniques for SCR [10]
- Q5.a) Draw and explain Boost regulator with waveforms and derive the relation for output voltage. [10]
- b) In a Buck converter, the switch is operated at 25kHz. Given that, input voltage=14V and load resistance is 200Ω . If the output voltage required is $V_o=6v$ voltage and peak to peak ripple current in inductor is limited to 0.8A, calculate (a) duty cycle; (b) value of Inductor [10]
- Q6. Write short notes on (any two) [20]
- a) Single phase Dual- Converter
 - b) Write short notes on Silicon Carbide (SiC) and GaN devices
 - c) Performance parameters of Inverter
 - d) Two-transistor’s analogy of SCR
