

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 200 Ω . 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
