

Time : 3hrs

[Total : 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. Explain construction of D-MOSFET
  - b. Draw waveforms of different PWM techniques of inverter [5]
  - c. Compare power MOSFET and IGBT [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) Differentiate between natural and forced commutation circuits. Explain any two commutation techniques in detail [10]
- b) Explain single phase full converter with circuit diagram and draw appropriate waveforms. [10]
- Q3.a) Draw and explain 3-phase bridge inverter for 120 degree conduction mode. [10]
- b) Explain Turn-ON and Turn-OFF characteristics of SCR with appropriate waveforms. [10]
- Q4. a) Draw and explain Single phase Dual- Converter [10]
- b) Write different Turn-ON techniques for SCR [10]
- Q5.a) Draw and explain Buck regulator with waveforms and derive the relation for output voltage. [10]
- b) What is Two-transistor's analogy of SCR derive relation for anode current using two-transistor's analogy. [10]
- Q6. Write short notes on (**any two**) [20]
- a) Write short notes on Silicon Carbide (SiC) and GaN devices
  - b) Explain SOA of MOSFET with appropriate diagrams
  - c) Performance parameters of Inverter