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. Explain significance of free-wheeling diode.   **[5]**
     b. Compare power BJT, MOSFET and IGBT   **[5]**
     c. Explain need of Heat Sink in PE circuits   **[5]**
     d. Define Latching and Holding current.
     e. Give applications of DC to DC converter.   **[5]**
     f. Explain any one forced commutation circuit   **[5]**

Q2. a) Defined different performance parameters of single-phase bridge inverter.   **[10]**
     b) Draw and explain PWM techniques for the control of output voltage of Inverters.   **[10]**

Q3. a) Draw and explain 3-phase full bridge converter and draw following wavwforms for α=30º 1.
     supply voltage, 2. firing pulses, 3. Load voltage for resistive load.   **[10]**
     b) What is a safe operating area of a semiconductor switch? How is the conduction and switching
     loss calculated?   **[10]**

Q4. a) Draw and explain single phase full Dual converter.   **[10]**
     b) Explain different protection techniques of SCR in detail.   **[10]**

Q5. a) Draw and explain Buck regulator with waveforms and derive the relation for output voltage.   **[10]**
     b) Draw and explain 3 phase inverter in 120^0 mode of operation   **[10]**

Q6. Write short notes on (**any two**)   **[20]**

     a) Two-transistor's analogy of SCR
     b) Gate triggering circuits of SCR
     c) Bootstrap driver circuit

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