(3Hours) [Total Marks:80]

N.B.: (1) Question No. 1 is compulsory.
   (2) Solve any three questions out of remaining five questions.
   (3) Figures to the right indicate full marks.
   (4) Assume suitable data if required.

1. Attempt the following :- **20**
   (a) Draw and explain the static V-I characteristics of SCR. Define the latching and holding current.
   (b) Explain the principle of operation of single phase voltage controller with R load.
   (c) What is pulse width modulation? List the various PWM techniques. How do these differ from each other?
   (d) Explain the principle of operation of Dual Converter.

2. (a) Explain with neat circuit diagram and waveforms the operation of three phase half controlled rectifier with R load. **10**
   (b) With the help of neat diagram, explain the operation of R-C firing circuit. Also draw and explain the associated waveforms. **10**

3. (a) Explain the operation of single phase, fully controlled bridge converter with RL load. Derive the expression for average load voltage and load current. **10**
   (b) With the help of neat diagram and associated waveforms discuss the operation of Buck-Boost converter. **10**

4. (a) Explain with neat diagram and waveform the operation of single phase half bridge voltage source inverter with R-L load. **10**
   (b) Draw and explain the output characteristics of n-channel MOSFET. What is the significance of the safe operating area of a power MOSFET? **10**

5. (a) Explain the working of single phase cyclo converter with the help of neat diagram and waveforms. **10**
   (b) Explain the working of three phase bridge inverter in 180° conduction mode with circuit diagram and associated waveform. **10**

6. (a) Why commutation is required in thyristor circuits? State various commutation techniques used for thyristors. Describe class 'C' commutation with relevant waveforms. **10**
   (b) With the help of neat structural diagram, explain the operation of GTO. Also explain its switching behaviour. **10**