



1. A three-phase, half-wave, uncontrolled rectifier has a supply of 220V / phase. Given that the diode has a voltage drop of 0.7V and the load current is level at 35A,
  - (a) Draw the waveforms of the: output voltage, diode currents, diode voltage ( $V_{D1}$ ), output current and supply current.
  - (b) Determine: the average value of the load voltage and the current and peak inverse voltage ratings of the diodes.
  - (c) What is the average power dissipation in each diode?
  - (d) What are the converter efficiency and the supply P.F.?
  
2. Repeat Problem (1) if the load is a pure resistive of 25  $\Omega$ .
  
3. A three -phase, half-wave, controlled rectifier is connected to a 380V (Line) AC supply. The load current is 32A and is independent of the firing angle. Find the mean load voltage for firing angles of 0°, 30°, 60° and 90° given that the thyristor has a voltage drop of 1.2V.
  - (a) Draw the waveforms of: load voltage, SCR currents, SCR voltage ( $V_{T1}$ ) and supply currents.
  - (b) What are the values of current and peak reverse voltage ratings of thyristors?
  - (c) What is the average power dissipation in each thyristor?
  - (d) What are the converter efficiency and supply P.F.?
  
4. A three-phase, half-wave, controlled rectifier is connected to a 380V (Line) AC supply. The rectifier is supplying a pure resistive load of 25 $\Omega$ .
  - (a) Determine the required firing angle ( $\alpha$ ) if the output DC voltage is:
    - (i) 90% of the maximum value.
    - (ii) 25% of the maximum value.
  - (b) Compare the range of  $\alpha$  with that in Problem (3)



5. A three-phase, half-wave, controlled AC/DC rectifier is supplying a load with continuous constant current of 25A over a range of firing angles from  $0^\circ$  to  $75^\circ$ . What will be the power dissipated by the load at these limiting values of firing angle? The AC supply voltage is 380V (line), 50Hz. Determine the required thyristor ratings.
6. A three-phase, half-wave, controlled rectifier is supplying an RL-load with a Free-wheeling diode ( $D_f$ ) which is connected across it.
- (a) Plot the output voltage waveform and a curve of mean load voltage against the firing angle. Consider the AC supply to be 100V/phase and neglect the switching device volt-drop.
- (b) Compare the control range of  $\alpha$  with that in the case of no ( $D_f$ ).