[06 – 3218]

III/IV B.E. DEGREE EXAMINATION.

Second Semester

Electrical and Electronics Engineering

POWER ELECTRONICS

(Effective from the admitted batch of 2006–2007)

Time : Three hours Maximum : 70 marks

Question No. 1 is compulsory.

Answer any FOUR from the remaining.

All questions carry equal marks.

1. (a) Describe holding current, latching current as applicable to an SCR with the help of its static V-I characteristic.

(b) Explain in brief the prime requirement of a trigger pulse transformer.

(c) Write a brief note on string efficiency of SCRs.

(d) Justify the statement "Freewheeling diode improves the power factor of the system".

(e) How are inverters classified?

(f) Draw the schematic of step-up chopper.

(g) Explain the basic principle of operation of a cycloconverter with a neat equivalent circuit diagram.

2. (a) Draw the turn off characteristic of an SCR and explain the mechanism of turn-off.

(b) What are the different methods for turning off an SCR? Explain all methods in detail.

3. (a) Draw and explain the necessity of static and dynamic equalizing circuit for series connected SCRs.

(b) Draw and explain circuit diagram for the synchronized UJT triggering.

4. (a) Explain with the help of neat power diagram and associated waveforms, the operation of a single-phase half wave controlled converters with (i) resistive load (ii) inductive load.

(b) Explain the effect of source inductance on the performance of a three-phase fully controlled bridge converter.

5. (a) Explain the following performance parameters of inverters.

   (i) Harmonic factor of n^{th} harmonic

   (ii) Total harmonic distortion

   (iii) Distortion factor

   (iv) Lowest order harmonic.

   (b) Compare between voltage source and current source inverters.

6. (a) Explain the time ratio control, current limit control and control strategies used for chopper.

   (b) With the help of circuit diagram, explain the working of step-up chopper.

7. (a) Describe the basic principle of working of a single-phase to single-phase cycloconverter for continuous conduction for a bridge type cycloconverter.

   (b) Draw and explain the control circuit block diagram for a cycloconverter with non circulating current mode.

8. (a) Explain the safe operating areas of IGBT.

   (b) How does a GTO differ from a conventional thyristor? Give its circuit symbol.
