Roll No.....

National Institute of Technology Delhi

Name of the Examination: B.Tech

Branch : EEE & ECE

Semester : VI

Course Name : Power Electronics

Course Code : EEB-351

Time: 2:00 hour

Maximum Marks: 25

Note:

- All Questions are compulsory.
- Do not write irrelevant theory and draw neat waveforms and circuit diagrams.
- Assume data where ever required.

Q1) Discuss the two-transistor model of a thyristor. Derive an expression for the anode current. (4)

Q2) Describe the working of a single-phase full converter in the inverter mode with RLE load. Illustrate your answer with waveforms for source voltage, E, load voltage and current, source current, current through and voltage across SCR. Assume continuous conduction. Find also the circuit turn-off time. Should the average output voltage be more than E during inverter operation? Discuss. (4)

Q3) Describe the working of a single-phase two-pulse asymmetrical semiconverter with RL load. Illustrate your answer with waveforms for source voltage, load voltage and load current, source current, current through and voltage across SCR. Assume continuous conduction. Find also the circuit turn-off time. (4)

Q4) What is a multiphase chopper? Bring out clearly, with appropriate waveforms, the difference between the in-phase operation and phase-shifted operation of a multiphase chopper. Hence show why phase-shifted operation is preferred. Enumerate the merits and demerits of multiphase choppers. (4)

Q5) For type-A chopper, dc source voltage = 230 V, load resistance = 10Ω. Take a voltage drop of 2 V across chopper when it is on. For a duty cycle of 0.4, calculate:
(a) average and rms values of output voltage
(b) chopper efficiency

(2+2)

Q6) A single-phase half wave controlled rectifier with R load is fed from a 230 V, 50 Hz ac supply. When R = 10Ω & $\alpha = 60^0$, determine (a) rectification efficiency (b) form factor (c) ripple factor (d) TUF (e) PIV of thyristor. (5)