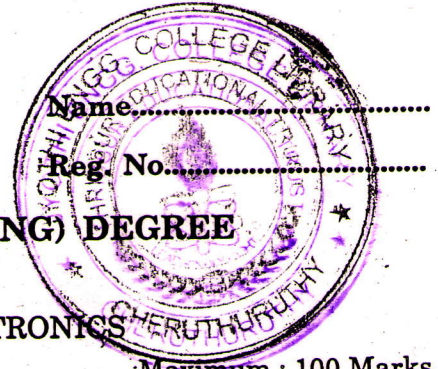**C 20563**

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION, JUNE 2006

EE2K 602/PTEE 2K 502—POWER ELECTRONICS

Time : Three Hours   Maximum : 100 Marks

Answer **all** *questions.*

I. (a) Give the constructional details of an SCR.

(b) Explain in detail the turn-off mechanism of an SCR.

(c) A highly inductive load, such that load current can be assumed constant, is to be supplied from a 230V, 50 Hz, single-phase supply by a half-controlled bridge. Compute the average d.c. voltage for (i) $\alpha = 0°$; (ii) $\alpha = 30°$ and (iii) $\alpha = 90°$.

(d) Draw the circuit diagram and voltage wave forms of a parallel commutated inverter without freewheeling diodes.

(e) Explain the operation of single-phase a.c. voltage regulator.

(f) With the help of circuit diagram, explain the operation of step-up chopper.

(g) Give the advantages and disadvantages of boost regulator.

(h) Write short notes on : phase synchronisation in UPS. System.

(8 × 5 = 40 marks)

II. (a) Define and explain the following terms in connection with SCR ; (i) Peak inverse voltage ; (ii) critical rate of rise of voltage ; (iii) voltage safety factor ; (iv) Latching current and (v) Holding current.

Or

(b) Draw and explain the firing circuit using UJT for a single-phase controlled rectifier with waveforms.

III. (a) Describe the working of single-phase fully controlled bridge converter in the following modes : (i) Rectifying mode and (ii) Inversion mode. Also sketch the load voltage and load current waveforms for $\alpha = 45°$ and $\alpha = 120°$.

Or

(b) What is pulse width modulation ? List the various PWM techniques. How do these differ from each other ?

IV. (a) Explain with power circuit and waveforms, the operation of a single-phase to single-phase cycloconverter.

Or

(b) Draw and explain the operation of a speed control of a d.c. series motor by a single-phase semiconverter for the continuous motor current. Draw also the associated voltage and current waveforms.

V. (a) With suitable block diagram, explain the operation of a Off-line UPS system.

Or

(b) Explain with suitable diagrams and waveforms the operation of buck-boost regulator.

(4 × 15 = 60 marks)