D 27178

Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION, DECEMBER 2006

EC 2K 506 B/AI 2 K 506 B—POWER ELECTRONICS

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

I. (a) Give the comparison between transistors and thyristors.

(b) What are *dv/dt* and *di/dt* ratings of SCRs. What happens if these ratings are exceeded ?

(c) Sketch the load voltage and load current wave forms of a single-phase fully-controlled bridge converter with RL load for $\alpha = 45°$ and $\alpha = 120°$.

(d) Compare the various methods employed for the control of output voltage of inverters.

(e) Give the advantages of variable frequency induction motor drives.

(f) Describe the working of multistage sequence control of a.c. voltage regulators.

(g) List the advantages of buck-boost regulator.

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

(8 × 5 = 40 marks)

II. (a) With the help of a neat diagram, explain the two transistor analysis of an SCR. Also explain its V-I characteristic.

Or

(b) Draw the V-I characteristics of a TRIAC and explain its working principle. Also explain the various triggering modes of a TRIAC.

(15 marks)

III. (a) A single-phase fully-controlled bridge converter is used for obtaining a regulated d.c. output voltage. The r.m.s. value of the a.c. input voltage is 230 V and firing angle is maintained at 60°, so that the load-current is 4 A :

(i) Calculate the d.c. output voltage and the active and reactive power input.

(ii) Assume that the load resistance remains the same, calculate the quantities in Part (i) if a free wheeling diode is used at the output. The firing angle is maintained at 60°.

Or

(b) Explain the operation of a single-phase bridge inverter with the help of voltage waveforms.

(15 marks)

IV. (a) Draw the schematics and operation of step-down and step-up choppers and derive an expression for output voltage in terms of duty-cycle for a step-up and step-down chopper.

Or

(b) With power circuit and wave forms, explain the operation of a single-phase to single-phase cycloconverter.

(15 marks)

V. (a) Describe the operation of a ON-line UPS system with suitable block diagram.

Or

(b) Explain with suitable diagram and waveforms, the operation of cuk regulator.

(15 marks)

[4 × 15 = 60 marks]