D 1942

Name.....

Reg. No.....

FIFTH SEMESTER B.Tech. (ENGINEERING) DEGREE EXAMINATION DECEMBER 2004

(New Scheme)

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

Time : Three Hours

Maximum : 100 Marks

Answer **all** *questions.*

I. (a) Explain in detail the power rating of SCR.

(b) Derive the expression for periodic time T of the UJT relaxation oscillator.

(c) Derive an expression for the average d.c. load voltage for single-phase fully controlled converter with (i) resistance load and (ii) inductance load.

(d) List the various PWM techniques. How do these differ from each other ?

(e) List the advantages and disadvantages of half-wave and single-phase a.c. regulator.

(f) Explain with suitable diagram, the operation of step-up d.c. chopper.

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

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

(8 × 5 = 40 marks)

II. (a) Explain the various types of triggering (turning on) methods of SCR in detail. Which is the universal method and why ?

(15 marks)

Or

(b) With the help of neat structural diagram and suitable waveforms, explain the operation of insulated-gate BJT (IGBT).

(15 marks)

III. (a) Explain with the help of neat power-diagram and associated waveforms, the operation of a single-phase half-controlled converter with (i) Resistive load and (ii) Inductive load.

(15 marks)

Or

(b) Draw and explain the simple SCR series inverter circuit employing class A type commutation. Draw and discuss the important waveforms. State the limitations of this series inverter.

(15 marks)

IV. (a) Discuss the working of a two-stage sequence control of voltage regulators for both R and RL loads. What is the advantage of this regulator over a single-phase full-wave voltage regulator ?

(15 marks)

Or

(b) Draw and explain with suitable diagrams, the operation of a speed control of a d.c. shunt motor.

(15 marks)

V. (a) Explain with suitable circuit diagram and waveforms, the operation of Buck regulator.

(15 marks)

Or

(b) Explain with suitable block diagram, the operation of ON-line UPS system. (15 marks)