D 51619 (Pages 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION, DECEMBER 2008

AI 04 505—POWER ELECTRONICS

(2004 admissions)

Time : Three Hours Maximum : 100 Marks

Part A

I. (a) Give the symbols and differentiate between SCR, Triac, Diac, SCS and SUS.

(b) Explain the characteristics of IGBTs and their applications.

(c) Write a note on cyclo converters.

(d) Write down the design considerations of AC voltage controller circuits.

(e) What are the classes of choppers ?

(f) Explain the working principle of a dual converter.

(g) With Schematic, explain the working of boost regulator.

(h) Write a note on isolation amplifiers.

(8 × 5 = 40 marks)

Part B

II. (a) Draw the characteristics of MOSFET and explain. Define relevant device parameters. (10 marks)

(b) Explain the static characteristics of MCTs. (5 marks)

Or

(c) Explain parallel and in series connection of SCRs and the various design concerns. (9 marks)

(d) Explain the turn off mechanisms of SCRs. (6 marks)

III. (a) A SCR is connected in series with a load resistor R = 200 Ω. What will be the average power across the load when the SCR is fired at an angle $\pi/3$ in every positive half cycle of the applied voltage 220 sin 216t. (8 marks)

(b) With circuit and waveforms, explain the operation of three-phase cyclo converter. (7 marks)

Or

Turn over

(c) With circuit and waveforms, explain the working of a UJT relaxation oscillator.

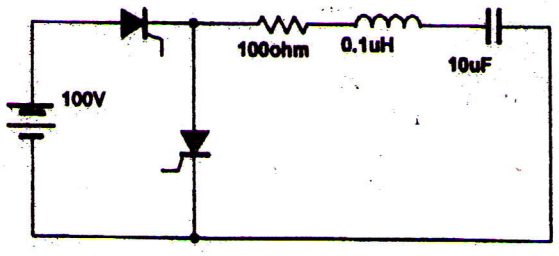
(8 marks)

(d) Explain how phase control is achieved with voltage controlled oscillator method.

(7 marks)

IV. (a) Explain the principle of current source inverter in detail. (9 marks)

(b) Calculate the maximum possible frequency of the SCR controlled series inverter.



(6 marks)

Or

(c) What should be the values of L and C when an RF filter is used for an SCR controlled circuit with a load resistance RL = 120 Ω ? Assume the break point frequency to be 60 KHz.

(7 marks)

(d) Write a note on vector control of induction motor. (8 marks)

V. (a) Explain the principles of resonant and bi-directional power supply. (9 marks)

(b) What is the need for derive circuits for power MOSFET ? Explain the methods used.

(6 marks)

Or

(c) With a circuit diagram, explain the working principle and role of synchronization circuits.

(9 marks)

(d) Explain the role of microprocessors in power electronics circuits. (6 marks)

(4 × 15 = 60 marks)