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D 4171

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2008.

Fourth Semester

Mechatronics Engineering

EE 1263 — POWER ELECTRONICS

(Regulation 2004)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define Latching current and Holding current of Thyristor.

2. What are the main differences between MOSFETs and BJTs?

3. What is meant by inversion mode of converters?

4. What is the effect of source inductance in single phase full converters?

5. Mention the control techniques used in DC chopper.

6. What are the advantages of Load Commutated Chopper?

7. Write the differences between Voltage source inverter and Current source inverter.

8. Classify the various PWM methods used in inverter?

9. What is the need for Sequence Control of AC Voltage Controllers?

10. What is meant by Step up Cycloconverter?

PART B — (5 × 16 = 80 marks)

11. (a) Describe the operation of Thysistor using Two transistor model and draw its VI characteristics. (16)

Or

(b) Explain the static and switching characteristics of IGBT with neat sketch. (16)

12. (a) Explain the working of single phase full converter in the inversion mode with RLE load. Sketch the suitable voltage and current waveforms. (10 + 6)

Or

(b) Describe the effect of source inductance on the performance of a 3 phase full converter with the help of phase voltage waveforms. Derive an expression for its output voltage. (12 + 4)

13. (a) Describe the principle of step up chopper. Drive an expression for the average output voltage in terms of input dc voltage and duty cycle. State the assumptions made. (8 + 8)

Or

(b) Explain the working of Voltage commutated chopper with relevant voltage and current waveforms as a function of time. (16)

14. (a) Describe the working of single phase parallel inverter with relevant circuit and waveforms. (16)

Or

(b) A Single phase Auto sequential commutated current source inverter is fed from 220 V dc source. The Load R is 10 Ω. Thysistors have turn off time of 20 μs and inverter output frequency is 50 hz. Take a factor of safety of 2. Determine suitable value of source inductance assuming a maximum current change of 0.5 A in one cycle. Find also the values of commutating capacitors. (16)

15. (a) Describe the operation of multistage sequence control of AC voltage controller with suitable power circuit. (16)

Or

(b) Explain the basic principle of working of Single phase to Single phase Step down Cycloconverter for both continuous and discontinuous conditions. Mention the conduction of various thyristors also. (16)
