S 9141

E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2006.

Fourth Semester

Mechatronics Engineering

EE 332 — POWER ELECTRONICS

: Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is the difference between an SCR and a TRIAC?
2. Define latching current of thyristors?
3. How will you operate the 6-pulse converter in the inverter mode?
4. What is the need for a current limiting reactor in a dual converter?
5. What is a current commutated chopper?
6. What are the drawbacks of voltage commutated chopper?
7. List any two advantages of using PWM inverters.
8. What are the disadvantages of series inverters?
9. What is meant by sequence control in AC voltage controllers?
10. Name some applications of cyclo converter?

PART B — (5 × 16 = 80 marks)

11. (a) Explain the principle of operation and characteristics of GTO. (16)

Or

(b) (i) What is the difference between MOSFET and IGBT? (4)

(ii) Explain the working of IGBT. (12)

12. (a) With a aid of a neat power circuit diagram explain the operation of a three phase controlled bridge rectifier with RL load using necessary waveforms. Derive an expression for its output dc voltage. (16)

Or

(b) A single phase full converter is connected to ac supply of 330 sin 314 volt and 50 Hz. It operates with a firing angle of $\alpha = \frac{\pi}{4}$ rad. The tota load current is maintained constant at 5A and the load voltage 140 V Calculate the source inductance, angle of overlap and the load resistance. (16)

13. (a) Draw the power circuit diagram of a load commutated chopper. Explain its operation with relevant waveforms. (16)

Or

(b) Explain the principle of working of step up chopper. Derive the expression for its output voltage. (16)

14. (a) With the aid of a neat power circuit diagram explain the working of auto sequentially commutated current source inverter. (16)

Or

(b) Explain the working of 180° mode of operation of voltage source inverter with a neat power circuit diagram. Draw relevant waveforms. (16)

15. (a) Write short notes on the following :

(i) Integral cycle control

(ii) Gating signal requirement of AC voltage controller

(iii) Multistage sequence control

(iv) Step up cyclo converter. (16)

Or

(b) Explain in detail the principle of working 1φ-1φ step down cyclo converter. (16)
