

G 7142

M.E. DEGREE EXAMINATION, JANUARY 2006.

First Semester

Power Electronics and Drives

PE 1602 — ADVANCED POWER SEMICONDUCTOR DEVICES

(Regulation 2005)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What do you mean by switching losses?
2. What is EMI?
3. Write two necessary conditions for turning on of an SCR.
4. Define string efficiency for series/parallel connected SCRs.
5. How does a GTO differ from a conventional thyristor?
6. What is the function of snubber circuit?
7. What is the function of connecting a zener diode in an UJT circuit?
8. Define conduction and convection.
9. What are the different types of mounting power electronic devices?
10. What is the use of pulse transformer?

PART B — (5 × 16 = 80 marks)

11. (i) Draw the forward and reverse characteristics of power diode and explain. (6)
- (ii) With relevant characteristic curve explain the switching nature of power diode. (5)
- (iii) Discuss voltage rating and current rating of power diode. (5)
12. (a) (i) Draw dynamic characteristics of a thyristor during its turn-on and turn-off process and explain. (6)
- (ii) Explain two transistor analogy of thyristor. (7)
- (iii) What is secondary breakdown in BJT? (3)

Or

- (b) (i) What are converter grade and inverter grade thyristors? (4)
- (ii) Describe how two series connected SCRs are subjected to unequal voltage distribution during their dynamic conditions. (7)
- (iii) Compare BJT and thyristor. (5)
13. (a) (i) Explain the construction and switching characteristics of power MOSFET. (8)
- (ii) Write short notes on GTO and RCT. (8)

Or

- (b) (i) Draw the steady state and dynamic models for IGBT and explain. (8)
- (ii) Write short notes on MCT and RCT. (8)
14. (a) Discuss how a thyristor may be subjected to internal and external over voltages. Describe the methods adopted for suppressing such over voltages in thyristor systems. (16)

Or

- (b) Explain the methods adopted for the protection of SCRs against over currents. (16)

15. (a) (i) What is thermal resistance? Describe the analogy between thermal and electrical quantities. (8)
- (ii) Describe the method of designing the heat sinks for thyristors. (8)

Or

- (b) (i) Write short notes on liquid cooling and vapour phase cooling. (8)
- (ii) Discuss various mounting techniques with relevant diagrams. (8)
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