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Question Paper Code: 12055

M.E. DEGREE EXAMINATION, DECEMBER 2013.

First Semester

Power Electronics and Drives

01PPE104 – MODERN POWER SEMICONDUCTOR DEVICES

(Regulation 2013)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions.

PART A - (10 x 2 = 20 Marks)

1. Define reverse recovery time of power diode.
2. What is EMI?
3. Define the term latching current of thyristor.
4. What is natural commutation?
5. What are the advantages of TRIAC?
6. What is the difference between RCT and FCT?
7. What is the use of pulse transformer?
8. What is the role of snubber circuit in power semiconductor devices?
9. Define the terms conduction and convection.
10. How do you relate the thermal and electrical quantities?

PART - B (5 x 14 = 70 Marks)

11. (a) (i) What are the characteristics of an ideal power switching devices? (7)
(ii) Draw the dynamic characteristic curve and explain the switching nature of power diode. (7)

Or

- (b) (i) Define the following: On state voltage, RMS current rating, Commutation, Non repetitive surge current rating. (8)

- (ii) Write short notes on switching device selection strategy. (6)
12. (a) (i) Draw the static V-I characteristics of thyristors and explain its modes of operation. (7)
- (ii) Write short notes on power Darlington connection. (7)

Or

- (b) (i) Write short notes on series and parallel operation of thyristors. (7)
- (ii) Draw and explain turn on and turn off characteristics of BJT. (7)
13. (a) (i) Briefly explain the construction and working principle of power MOSFET. (7)
- (ii) Write short notes on MCT & RCT. (7)

Or

- (b) (i) Briefly explain the construction and working principle of IGBT. (7)
- (ii) Explain the four modes of operations of power TRIAC. (7)
14. (a) (i) Explain electronic crowbar protection scheme employed for the overcurrent protection of power converters. (7)
- (ii) Write short notes on snubber circuits. (7)

Or

- (b) (i) Write short notes on over voltage and over current protections for semiconductor devices. (7)
- (ii) Draw the gate drive circuit for MOSFET and explain its operation. (7)
15. (a) (i) Discuss liquid cooling and vapour phase cooling. (7)
- (ii) Write short notes on heat sink types and their design. (7)

Or

- (b) (i) Write short notes on various methods of heat transfer. (7)
- (ii) Draw the electrical analogy of thermal components and explain. (7)

PART - C (1 x 10 = 10 Marks)

16. (a) Discuss the factors to be considered while designing and selecting a heat sink. (10)

Or

- (b) Draw the symbols of four power switching devices and mention few applications of each device. (10)