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Total Number of Pages : 02

M.TECH

**M.TECH 1<sup>ST</sup> SEMESTER REGULAR EXAMINATIONS, DECEMBER 2017  
ADVANCED POWER SEMICONDUCTOR DEVICES**

**Branch: PE, Subject Code:MPEPE1044**

**Time: 3 Hours**

**Max Marks : 70**

**The figures in the right hand margin indicate marks.**

**PART-A**

**( 2X10=20 MARKS)**

**1. Answer the following questions .**

- a. What is an Ideal Switch
- b. What are the parameters that affect the life time and performance of power semiconductor devices
- c. What are converter grade and inverter grade thyristors
- d. Brief the phenomenon of secondary breakdown in BJTs
- e. What are the features of Field controlled Thyristors
- f. Sketch the VI characteristics of MCT
- g. How the Gate of the Thyristor is protected against over voltages and over currents
- h. Give the comparison between BJT and MCT in terms of Gate circuit
- i. Give the significance of intelligent power modules
- j. The provision of heat sink improves the heat dissipation capability of the power device. Justify by modelling the system

**PART-B**

**(5 X 10=50 MARKS)**

**Answer any five questions from the following.**

2. a. Explain the switching Characteristics of SCR with relevant waveforms and describe the times associated with it
- b. A thyristor is fed from a constant DC voltage of 240Volts and connected to a resistive load of  $R_f=50$  ohms. The specified limits for  $di/dt=60$  amp/micro sec and  $dv/dt = 300v/micro$  sec. Determine the value of  $di/dt$  inductance and snubber circuit parameters. Assume damping ratio =0.5
3. a. Draw the reverse recovery characteristics of a power diode and explain the terms
  - (i) Reverse recovery time (ii) Peak inverse current and (iii) S-Factor. Also derive the

- expressions for reverse recovery time and peak inverse current
- b. Explain the following types of power diodes
    - i. Schotky Diode
    - ii. Line Frequency Diodes and
    - iii. Fast Recovery Diodes.
  4. a. Discuss the switching characteristics of IGBT
  - b. Explain the construction and operation of MCT
  5. a. Discuss the operation of enhancement and depletion type power MOSFET.
  - b. Explain the ratings and specifications of power MOSFETs
  6. a. Draw and explain the static and switching characteristics of Thyristor
  - b. Compare FCT, RCT and IGCT
  7. a. Explain over Voltage, over current and Gate Protection of Power BJT
  - b. Differentiate between Liquid Cooling and Vapour phase cooling
  8. a. Draw and explain the gate Driver circuit of SCR, BJT
  - b. Explain the design of Different types of Heat sinks

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