## M.E DEGREE EXAMINATIONS: JANUARY 2011

First Semester

## POWER ELECTRONICS & DRIVES

PED502: Advanced Power Semiconductor Devices

**Time: Three Hours**                                                     **Maximum Marks: 100**

### Answer ALL Questions:-

### PART A (10 x 2 = 20 Marks)

1. Give the properties of ideal switch?

2. What is commutation circuit?

3. Define holding current of a thyristor.

4. Compare BJT and thyristor.

5. What is transconductance in MOSFET?

6. Give the symbols of (a) JFET (b) MCT.

7. List three categories of snubbers.

8. What is pulse transformer?

9. What is a heat sink?

10. Draw electrical analogy of thermal component.

### PART B (5 x 16 = 80 Marks)

11. (a) (i) Give the types of diodes and explain the forward and reverse characteristics of power

     diode.                                                                        (12)

    (ii) Give short notes on SOA.                                                   (4)

### (OR)

   (b) (i) Explain the switching characteristics of power diodes                    (12)

      (ii) Write short notes on EMI due to switching.                               (4)


12. (a) (i) With neat sketch explain the switching characteristics of transistor.   (12)

     (ii) Give short notes on second breakdown in BJT.                              (4)

### (OR)

   (b) (i) Explain the switching characteristics of thyristor in detail.            (10)

      (ii) Explain latching action of thyristor using two transistor analogy.       (6)

13. (a) (i)Give the vertical cross section of power MOSFET and explain the static characteristics of MOSFET. (12)

(ii) Explain the physics behind turning off operation of GTOs. (4)

**(OR)**

(b) (i) Explain the switching characteristics of IGBT with a neat sketch. (12)

(ii) Give short notes on overcurrent protection of GTOs. (4)

14. (a) (i) Explain briefly gate drive design consideration of IGBT. (4)

(ii) Explain in detail any one driver circuit with over current protection for IGBT. (12)

**(OR)**

(b) (i)What are the functions of snubber circuits? (4)

(ii) Explain the design of snubber circuit for thyristors in detail. (12)

15. (a) Explain the heat transfer by conduction, convection and radiation in detail.

**(OR)**

(b) (i) Explain various mounting techniques of thyristor in detail with neat sketch. (12)

(ii) Write short notes on Heat sink selection guidelines. (4)

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