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Total No. of Pages : 01

Total No. of Questions : 08

M.Tech.(EE) (2013 Onwards) (Sem.–1)

ADVANCED POWER ELECTRONICS

Subject Code : MTEE-102

M.Code : 70726

Time : 3 Hrs. Max. Marks : 100

INSTRUCTION TO CANDIDATES :

1. **Attempt any FIVE questions out of EIGHT questions.**
2. **Each question carries TWENTY marks.**

1. a) Discuss the turn-off mechanism of a Thyristor. Draw well labelled circuit diagrams with proper explanation.

   b) Compare and contrast a power IGBT with a power transistor.

2. a) Justify the following statement : '*The Thyristor exhibits the property of Hysterisis*'.

   b) Develop the thermal mode of the thyristor and explain its use.

3. a) Explain in detail the power MOSFET circuit and the construction of a vertical channel diffused MOS power MOSFET. Draw the schematic diagram.

   b) List out the advantages and disadvantages of power MOSFETS.

4. Calculate the switching losses of an IGBT for the following conditions both for the resistive load and clamped inductive load : V_{cc} = 200 V; tf1 = 0.5μs ; I_{CM} = 50A; t_{rv} = 0.5μs; f = 20kHz; tf2 = 2.5μs; t_{rv} = 0.5μs, where I_{CM} is the maximum value of collector current, t_{rv} is the collector to emitter voltage-rise time.

5. Explain the turn-off characteristics (Voltage and current) of a GTO. By making use of the snubber circuit for a GTO ,explain in detail, its role in the GTO circuits.

6. a) What are de-coupled Drive circuits?

   b) Give a firing circuit for a thyristor that uses a saturable reactor. Explain how a thyristor gets triggered with a high dv/dt.

7. a) What are the losses in a MOSFET ? Find out the expression for each one of them.

   b) What precautions have to be taken for MOSFETS to operate in parallel?

8. a) What is a latch-on in an IGBT? What steps have to be taken to avoid it?

   b) How many types of Power Integrated circuits (PICs) are there? What are their fields of applications?

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.