GIET MAIN CAMPUS AUTONOMOUS GUNUPUR – 765022

BD17002020

Registration No:

Total Number of Pages : 02 **M.TECH**

AR-17

M.TECH 1ST SEMESTER EXAMINATIONS(BACK), NOV/DEC 2019

PE, MPEPE1044

ADVANCED POWER SEMICONDUCTOR DEVICES

Time: 3 Hours **Max Marks : 70**

The figures in the right hand margin indicate marks.

PART-A

(10 X 2=20 MARKS)

1. Answer the following questions.

a. Distinguish between Power and Linear diodes

b. Define safe operating area

c. How is secondary breakdown avoided in BJT

d. What are current controlled devices? Mention its applications

e. What are the limitations of MOSFET? How does single electron theory overcome this limitations

f. Compare RCT and FCT

g. Draw the Gate driver circuit of BJT

h. What is the need of isolation for power semiconductor devices

i. Mention any 4 types of heat sinks suitable for semiconductor devices

j. What are the parameters to be considered for proper mounting of the device with heat sink

PART-B

(5 X 10=50 MARKS)

Answer any five questions from the following.

Q2.

a. What are the different types of power diodes? Explain

b. Explain the EMI phenomenon due to switching. What are the different methods to reduce it?

Q3.

a. Explain the two transistor transient model of a thyristor

b. Explain the Negative Temperature Coefficient and Secondary Breakdown of BJT

Q4.

a. Explain the construction of a power MOSFET.

b. Draw and explain the static and switching characteristics of power MOSFET

Q5.

a. Write a brief note on driver circuit of SCR.

b. Explain the necessity of using isolation, pulse transformer as protection circuits

Q6.

a) With the help of neat sketch, explain the electrical equivalent circuit of thermal model of a

power device.

b) Explain about heat sink consider an aluminium rod with measurement height, h=1cm, Breadth=1cm and length=20cm. The rate of heat energy entering at the left end (where the temperature is T_2) is 3W and the temperature at the right surface is $T_1=40^0C$. Find T_2. (Thermal conductivity $\lambda=200w\text{-}m^{-1}0_c^{-1}$)

Q 7.

a. Distinguish controlled and un-controlled devices.

b. Analyze V-I characteristics of various real switching devices

Q8.

a. Differentiate between GTO and SCR

b) A thyristor is fed from a constant DC voltage of 240Volts and connected to a resistive load of Rl=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

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