Reg. No. | | | | | | | | | |

M.E. / M.TECH. DEGREE EXAMINATIONS, MAY/JUNE 2017

FIRST SEMESTER

POWER ELECTRONICS AND DRIVES

PD16104 – ADVANCED POWER SEMICONDUCTOR DEVICES

(Regulation 2016)

Q. Code: 229170

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

Answer **ALL** questions

PART A - (10 X 2 = 20 Marks)

1. What is meant by softness factor of a diode?
2. State any two characteristics of ideal switch.
3. Why is the current gain of a transistor relatively small? Give the required modifications to improve the same.
4. How is secondary breakdown avoided in a BJT?
5. What is meant by 'latch-up' mode of an IGBT?
6. What is FCT?
7. What are the requirements of generation of gating signal for thyristors?
8. How to protect against over voltage and over current in the gate of the SCR?
9. Mention any four types of heat sink, suitable for power semiconductor devices?
10. What are the advantages of using intelligent power modules?

PART B - (5 X16 = 80 Marks)

11. (a) (i) Discuss the types and characteristics of power diodes. **(8)**

(ii) Draw and explain the switching characteristics of power diodes. **(8)**

(OR)

(b) (i) Explain the Safe Operating Area of a power device with a neat diagram. **(8)**

(ii) Discuss elaborately the occurrence of electromagnetic interference due to switching. **(8)**

12.	(a)	(i)	Discuss the importance of di/dt and dv/dt rating of thyristor.	**(8)**
		(ii)	Discuss the methods of turning - on of a thyristor.	**(8)**
			(OR)	
	(b)	(i)	Compare BJT and Thyristor with respect to power switching applications.	**(8)**
		(ii)	Explain about two transistor analogy in detail.	**(8)**
13.	(a)	(i)	Develop the dynamic model of a power MOSFET.	**(8)**
		(ii)	Write a short note on RCT and IGCT.	**(8)**
			(OR)	
	(b)	(i)	With a neat sketch explain the characteristics of enhancement type MOSFET	**(8)**
		(ii)	Compare the features of MOSFET and IGBT.	**(8)**
14.	(a)	(i)	What are the various gate drive circuits of a thyristor? Explain how the gate gets triggered with a high dv/dt.	**(8)**
		(ii)	Discuss the protection method employed to protect the SCR from transients and over currents.	**(8)**
			(OR)	
	(b)	(i)	What are the base drive techniques for increasing switching speeds of power transistors? Explain any one technique with a diagram.	**(8)**
		(ii)	What is a snubber circuit? How does it protect a thyristor from over voltages?	**(8)**
15.	(a)	(i)	Define conduction, convection and radiation.	**(8)**
		(ii)	Distinguish between on liquid cooling and vapour phase cooling.	**(8)**
			(OR)	
	(b)	(i)	Explain the various mounting techniques for SCRs.	**(8)**
		(ii)	Describe the method of designing the heat sinks for thyristors.	**(8)**