

Exam.Code:1018

Sub. Code: 7463

2063

M.E. Electrical Engineering (Power System)  
Second Semester

EE-8209 (a): Advanced Power Electronics Techniques and Devices for Power Systems

Time allowed: 3 Hours

Max. Marks: 50

**NOTE:** Attempt any five questions.

x-x-x

1. (a) Explain thermal ionization of silicon atom with suitable diagram. (5)  
(b) What are the selection criterion for power electronics switches? (5)
2. a) Distinguish between punch through and non-punch through type power diodes. (5)  
b) Discuss the principle of operation of a Schottky diode and mention the significance of guard ring. (5)
3. (a) Draw the V-I characteristics and Reverse recovery characteristics of Power Diode and explain. (5)  
(b) Draw the basic structure of Power Diode and explain the device operation. (5)
4. (a) Discuss quasi saturation and hard saturation region of a power transistor. (5)  
(b) Discuss the on state losses in power BJT. (5)
5. Explain the operating limitations and safe operating area of a power MOSFET. (10)
6. Explain IGBT's switching characteristics. Derive its equivalent circuit from its structural details and explain. (10)
7. P-channel MOSFETs required about three times the area on a silicon wafer to achieve a performance compared to an n-channel MOSFET. However, p-channel IGBT have the same area as n-channel IGBTs. What are the reasons for the differences between the IGBT behavior and the MOSFET behavior? (10)
8. Deduce the Two Transistor Model for a Thyristor and explain the Thyristor operation using this model. (10)

x-x-x