



**SIDDHARTH GROUP OF INSTITUTIONS :: PUTTUR**  
Siddharth Nagar, Narayanavanam Road – 517583

**QUESTION BANK (DESCRIPTIVE)**

**Subject with Code :** Advanced Power semiconductor devices and Protection (16EE4308)

**Course & Branch:** M.Tech - PE Year & Sem: I-M.Tech & II-Sem

**Regulation:** R16

**UNIT –I**

1. Discuss the construction of BJT. Also draw and discuss its I-V characteristics?
2. a) What are Power MOSFET's ? What are the advantages of Power MOSFET's over BJT  
b) Draw and explain the output characteristics of Enhancement type MOSFET's
3. a) Draw and Discuss output characteristics of BJT ?  
b) Explain second break down, forward- biased safe operating area (FBSOA).
4. a) What are the main differences between BJT and MOSFETs ?  
b) What are the different types of MOSFETs? Bring out the differences among different types of MOSFETs
5. Explain the Switching characteristics of BJT?
6. Explain the Switching characteristics of Power MOSFETs [L2][10M]
7. a) Explain On-State losses and Break down Voltages of BJT?  
b) Discuss about Safe Operating Areas of BJT?
8. a) Explain I-V Characteristics of MOSFET's ?  
b) What are the main differences between BJT and MOSFETs?
9. a) Explain On-State losses and Break down Voltages of BJT?  
b) Explain the relevant wave forms, the secondary break down phenomenon of the semiconductor Devices.
10. a) Describe the different breakdown voltages.  
b) Describe the following:  
(i) Forward biased safe operating area. (ii) Reverse biased safe operating area.

**UNIT -II**

1. a) Draw and explain the construction details of a GTO  
b) Write the advantages and applications of a GTO.
  
2. a) What are advantages and disadvantages of IGBTs ?  
b) Draw and explain the cross sectional view of an IGBT. Also draw the equivalent circuit of an IGBT?
  
3. a) What is a Snubber circuit? What is its need?  
b) Explain the turn-off process in GTOs?
  
4. a) An IGBT combines the advantages of BJTs and MOSFET's .Justify  
b) Draw and discuss typical output and transfer characteristics of IGBTs?
  
5. a) Discuss I-V Characteristics of IGBT ?  
b) Draw and explain the cross sectional view of an IGBT. Also draw the equivalent circuit of an IGBT?
  
6. (a) Explain the merits and demerits of a GTO over the other thyristor.  
(b) Explain the physics of device operation for the gate turn off thyristor.
  
7. (a) Explain the basic structure and I-V characteristics of IGBTs.  
(b) Explain the switching characteristics of IGBTs.
  
8. (a) Explain the switching characteristics of GTO.  
(b) Write short note on the design of snubber circuit for GTO
  
9. a) Define the term " turn off gain " referred to GTO.Draw the sketch of GTO turn off transient?  
b) What are different gating requirements for GTO? Explain
  
10. a) Draw and explain the structure of IGBT ?  
b) Briefly Explain about device limits and safe operating area of an IGBT?

**UNIT –III**

1. a) Discuss the operation of Field controlled Thyristor ?  
b) Discuss some new semiconductor materials?
  
2. a) What are MOS controlled thyristors ? Discuss their constructional details?  
b) Discuss the advantages and disadvantages of MOS controlled thyristors?
  
3. Explain the Power Integrated circuits?
  
4. a) What are MOS controlled thyristors ? Discuss their constructional details?  
b) Explain the future trends in power semiconductor devices?
  
5. a) What are MOS controlled thyristors ? Discuss their constructional details?  
b) Discuss the advantages and disadvantages of MOS controlled thyristors ?
  
6. (a) Explain the structure and I-V characteristics of field controlled thyristor.  
(b) Explain the structural view of MOS controlled thyristor.
  
7. (a) Explain the steps involved in the design of a transformer.  
(b) Briefly discuss the design procedure for developing heat sinks.
  
8. (a) Write a short note on new semiconductor materials.  
(b) Compare the JFET based devices with that of other power devices.
  
9. (a) How the unwanted electrical signals are generated which give rise to EMI?  
(b) Name the elements of electromagnetic compatibility (EMC) systems.  
(c) Explain the ways how EMC can be achieved.
  
10. Compare JFET and other power devices

**UNIT -IV**

1. What is the cause for noise generation? Explain about Common sources of noise in SMPS
2. What are the sources for EMI and write about EMI shielding
3. Explain about the transformer designing
4. What are the EMI standards and write about EMI shielding
5. Explain about noise and how it is measured?
6. a) Discuss the measurements of conducted noise in power electronic equipment.  
    (b) Briefly discuss the EMI shielding and EMI standards with respect to electronic equipment.
7. (a) Explain the different sources of noise.  
    (b) Explain the different methods to minimize EMI and also discuss an EMI standard
8. a) What are different of noise in SMPS circuits ? Explain about diode storage charge noise?  
    b) Explain different methods of minimizing EMI Noise in power electronic circuits?
9. Explain in detail about the need of Electromagnetic compatibility in power electronic circuits. How EMI is estimated? How noise can be suppressed?
10. Explain in detail about noise due to high frequency transformer?

**UNIT –V**

1. Explain about heat sinks and cooling methods.
2. What is snubber? Explain about voltage snubber ?
3. Explain about load side and supply side transients?
4. Write about thermal modeling of converter?
5. a) Explain the reverse recovery transients for the power electronic devices.  
b) Explain the fuse protection procedure for the controlled rectifier.
6. a) Explain the steps involved in the design of a transformer.  
b ) Briefly discuss the design procedure for developing heat sinks.
7. a) Write a short note on thermal modeling of any one power switching device.  
b) Discuss about supply and load side transients.
8. a) Explain about various protection methods used for power semiconductor devices  
b) Explain about heat sink and thermal modeling of power switching devices?
9. Explain about Voltage Protections in detail?
10. Explain about Current Protections in detail ?

Prepared by:

**J.YUGANDHAR**  
**ASSISTANT PROFESSOR**  
**DEPT.OF EEE**  
**SIETK**