

2125  
M. Tech. (Micro-Electronics)  
First Semester  
MIC-101: Semiconductor Device Physics

Time allowed: 3 Hours

Max. Marks: 50

*NOTE: Attempt five questions in all, including Question No. 1 which is compulsory and selecting two questions from each Unit.*

*x-x-x*

1. Attempt the following:-

- a) Define Quasi Fermi energy level?
- b) Explain zener breakdown effect?
- c) Compare between signal assignment and variable assignment statements.
- d) What is the distribution function?
- e) What is the effect of temperature on intrinsic carrier concentration? (5x2)

**UNIT - I**

2. Discuss the importance of reverse bias PN junction diode. Derive the relation for junction capacitance. (10)
3. Why pure crystal is required as a substrate in semiconductor devices? List various methods used in the growth of semiconductor material. Explain any one in detail. (10)
4. Define Fermi level. How is the Fermi distribution function used to calculate the electron and hole concentration in semiconductor? (10)

**UNIT - II**

5. Draw and explain the energy diagram for the Ideal MOS structure at equilibrium. Explain its non ideal effects also. (10)
6. Explain the frequency limitation factors in MOSFET. Derive relation for cut off frequency in ideal case. (10)
7. Explain the working of Heterojunction Bipolar Transistor. List its application. (10)

*x-x-x*