

Roll No.

Total No. of Questions : 08]

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M.Tech.

SEMICONDUCTOR DEVICES

SUBJECT CODE : VL - 511

Paper ID : [E0721]

[Note : Please fill subject code and paper ID on OMR]

Time : 03 Hours

Maximum Marks : 50

Instruction to Candidates:

- 1) Attempt any **Five** questions.
- 2) All questions carry equal marks.

Q1) (a) Define Fermi level. How is the Fermi distribution function used to calculate the electron and hole concentration in semiconductor?

(b) What is the effect of temperature on intrinsic carrier concentration?

Q2) (a) Define electron mobility. What is its importance?

(b) Derive the continuity equation.

Q3) What is the basic principle of carrier injection? Derive the expressions for electron and hole currents injected at the junction in a semiconductor diode and hence define the diode equation.

Q4) (a) What are the various sources of noise in bipolar transistor?

(b) Explain why the turn-on transient of a BJT is faster when the device is driven into oversaturation.

Q5) Describe the operation of bipolar transistor using Eber-Molls model.

Q6) (a) Discuss the basic operation of MOSFET.

(b) What are the limitations of MOSFET? How does single electron theory overcome the limitations?

- Q7) (a) Draw and explain the energy band diagram for the ideal MOS structure at equilibrium.
- (b) .What are the effects of electron velocity saturation at high electric fields in MOS device?

Q8) Write notes on the following :

- (a) Mextram model.
- (b) Statistical modeling.

