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Courses » Semiconductor Devices and Circuits

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Unit 13 - Week 12: Thin Film Transistors (TFTs), Tutorial Sessions

Course outline

Assignment 12

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.

Due on 2018-10-24, 23:59 IST.

1) Assume an n-type bulk non-crystalline semiconductor, in which, on an average an electron spends $10\,\%$ time in the conduction band, where it is free to move and rest of the time in the trapped states. The drift mobility of the electron is $2\,cm^2/V.s$. What is the conduction-band mobility (i.e. free carrier mobility) in $cm^2/V.s$ of the electron in that material? ***1 point***

- 0.2
- 2
- 20
- 200

No, the answer is incorrect.
Score: 0

Accepted Answers:
20

2) Assume an n-type thin-film transistor, in which the trapped electron concentration is much higher than the free electron concentration in the above-threshold operating regime. The electrostatics (Poisson's equation) is dominated by the _____ and the drift transport under drain bias is dictated by the _____. (Fill in the gaps) ***1 point***

- trapped electrons, trapped electrons
- trapped electrons, free electrons
- free electrons, trapped electrons
- free electrons, free electrons

No, the answer is incorrect.
Score: 0

Accepted Answers:

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- Rate of increase = (inflow - outflow) + generation - recombination

No, the answer is incorrect.
Score: 0

Accepted Answers:
Rate of increase = (inflow - outflow) + generation - recombination

4) Assume an undoped GaAs sample with the following properties of electrons: ***1 point***

Mobility, $\mu_n = 8.8 \times 10^3\ cm^2/V.s$.
Effective mass, $m_n^* = 0.067 m_0$, where, $m_0 = 9.1 \times 10^{-31}\ kg$.
Average velocity, $v_{avg} = 10^7\ cm/s$.
Calculate the mean free path of the electron.

- 33.5 nm
- 96.7 nm
- 134.8 nm
- 0.56 um

No, the answer is incorrect.
Score: 0

Accepted Answers:
33.5 nm

5) Which of the following statements is NOT true about the reverse bias breakdown due to impact ionization and Zener tunneling? ***1 point***

- Zener tunneling breakdown generally occurs at lower voltages than impact ionization.
- Zener tunneling generally has a stronger temperature dependence than impact ionization.
- Significant Zener tunneling only occurs when the junction is heavily doped.
- All of the above.

No, the answer is incorrect.
Score: 0

Accepted Answers:
Zener tunneling generally has a stronger temperature dependence than impact ionization.

6) For a pnp-BJT, which of the following expressions represents the Emitter Injection Efficiency ? ***1 point***

- $\frac{I_{nE}}{I_{pE}+I_{nE}}$
- $\frac{I_{pE}}{I_{pE}+I_{nE}}$
- $\frac{I_{pC}}{I_{pE}}$
- $\frac{I_{pE}}{I_{pC}}$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$\frac{I_{pE}}{I_{pE}+I_{nE}}$

7) Which of the following is not a desired characteristic of a good voltage amplifier ? ***1 point***

- High Input Impedance
- High Output Impedance
- High Voltage Gain
- High Operating Bandwidth

No, the answer is incorrect.
Score: 0

Accepted Answers:
High Output Impedance

8) Which of the following conditions represents the pinch-off point for a MOSFET ? ***1 point***

- $V_{DS} = V_T$
- $V_{DS} = V_{GS}$
- $V_{DS} = V_{GS} + V_T$
- $V_{DS} = V_{GS} - V_T$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$V_{DS} = V_{GS} - V_T$

9) Which of the following statements is false ? ***1 point***

- For a common-source amplifier with resistive load, voltage-gain can be made high by increasing the channel width of the MOSFET used.
- For a common-source amplifier with resistive load, voltage-gain can be made high by decreasing the channel length of the MOSFET used.
- For a BJT to be biased in active mode, Base-Emitter junction is forward biased and Base-Collector Junction is reverse biased
- A MOSFET used as a switch, is generally biased in saturation mode of operation

No, the answer is incorrect.
Score: 0

Accepted Answers:
A MOSFET used as a switch, is generally biased in saturation mode of operation

10)Which of the following statements are true ? ***1 point***

i. Presence of interface trap charges does not affect the subthreshold swing of a MOSFET device

ii. Channel length modulation has impact on the slope of output characteristics of a MOSFET

iii. Presence of gate-drain overlap gives rise to additional parasitic capacitance in a MOSFET device

iv. In the absence of channel length modulation effects, the saturation drain current in a MOSFET is independent of the applied drain-to-source voltage

- ii, iii
- iii only
- i, ii
- ii, iii, iv

No, the answer is incorrect.
Score: 0

Accepted Answers:
ii, iii, iv

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