Continuity equation
Lecture-12

TDC PART -1

PAPER 1(GROUP B)

Chapter -4

BY:

DR. NAVIN KUMAR

(ASSISTANT PROFESSOR)

(GUEST FACULTY)

Continuity equation

- The continuity equations are "bookkeeping" equations that take into account all of the processes that occur within a semiconductor.
- Drift, diffusion, and recombination-generation are constantly occurring in a semiconductor.

Continuity equations

They are very complex equation.

$$\frac{\partial n}{\partial t} = \frac{1}{q}\nabla \cdot \mathbf{J}_N + \left.\frac{\partial n}{\partial t}\right|_{\substack{thermal \\ R-G}} + \left.\frac{\partial n}{\partial t}\right|_{other\ processes}$$

$$\frac{\partial p}{\partial t} = -\frac{1}{q}\nabla \cdot \mathbf{J}_p + \left.\frac{\partial p}{\partial t}\right|_{\substack{thermal \\ R-G}} + \left.\frac{\partial p}{\partial t}\right|_{other\ processes}$$

- We have two equations and three unknowns, n, p, and V. With Poisson's equation, we have the third equation we need to solve problems using a computer.

$$\vec{\nabla} \cdot \vec{E} = \frac{\rho}{\varepsilon_0} = -\nabla^2 V$$