

# Maxwell's Equations

Pushkin Kachroo

**Electrostatic Force**  $F_e = qE$

**Electromagnetic Force**  $F_m = qu \times B$  ( $\Rightarrow$  Motor)

Law	Differential Form	Integral Form
<b>Gauss' Law</b>  $\Rightarrow$ Coulomb's Law	$\nabla \cdot D = \rho_v$	$\oint_S D \cdot ds = q$
<b>Faraday's Law of Induction</b>  $\Rightarrow$ Power Generation	$\nabla \times E = -\frac{\partial B}{\partial t}$	$\oint_C E \cdot dl = -\int_s \frac{\partial B}{\partial t} \cdot ds$
<b>Gauss' Law for Magnetism</b>  $\Rightarrow$ No Magnetic Monopoles	$\nabla \cdot B = 0$	$\oint_S B \cdot ds = 0$
<b>Ampere's Law</b>  $\Rightarrow$ Magnetic Field from Current	$\nabla \times H = J + \frac{\partial D}{\partial t}$	$\oint_C H \cdot dl = \int_s \left( J + \frac{\partial D}{\partial t} \right) \cdot ds$