**BASIC EQUATIONS OF ELECTRODYNAMICS**

**Maxwell's Equations**

In General: In Matter:

  

**Auxiliary Fields**

Definitions: Linear Media:

 

**Potentials**



**Lorentz Force Law**



**Energy**

Energy:  

**FUNDAMENTAL CONSTANTS**

|  |  |
| --- | --- |
| (permittivity of free space) | (charge of the electron) |
| (permeability of free space) | (mass of the electron) |

**SPHERICAL AND CYLINDRICAL COORDINATES**

**Spherical**

 

**Cylindrical**

 

**FUNDAMENTAL THEOREMS**

**Gradient Theorem:** 

**Divergence Theorem:** 

**Curl Theorem:** 

**VECTOR DERIVATIVES**

**Cartesian.**  

Gradient: 

Divergence: 

Curl: 

Laplacian: 

**Spherical.**  

Gradient: 

Divergence: 

Curl: 

Laplacian: 

**Cylindrical.  ** Gradient: 

Divergence: 

Curl: 

Laplacian: 

**VECTOR IDENTITIES**

**Triple Products**

(1) 

(2)   
**Product Rules**

(3) 

(4) 

(5) 

(6) 

(7)    
 (8)   
**Second Derivatives**

(9) 

(10) 

(11) 