1.

$$rot\vec{E} = -\frac{1}{c}\frac{\partial \vec{H}}{\partial t}, \quad rot\vec{H} = \frac{1}{c}\frac{\partial \vec{E}}{\partial t} + \frac{4\pi}{c}\vec{j}$$

$$div\vec{E} = 4\pi\rho, \quad div\vec{H} = 0, \quad \vec{F} = e\vec{E} + \frac{e}{c}[\vec{V}\vec{H}];$$

2.

$$\oint\limits_L \vec{E}_l d\vec{l} = -\frac{1}{c}\oint\limits_S \frac{\partial \vec{H}_n}{\partial t} d\vec{s}, \quad \oint\limits_L \vec{H}_l d\vec{l} = \frac{4\pi}{c}\oint\limits_S \left(\vec{j}_n + \frac{1}{4\pi}\frac{\partial \vec{E}_n}{\partial t}\right) d\vec{s}$$

$$\oint\limits_S \vec{E}_n d\vec{s} = 4\pi \int\limits_V \rho dv, \quad \oint\limits_S \vec{H}_n d\vec{s} = 0;$$

3.

$$\frac{\partial \rho}{\partial t} + div\vec{j} = 0, \quad -\frac{\partial \omega}{\partial t} = div\vec{\sigma} + (\vec{E}\vec{j})$$

4.

$$\vec{H} = rot\vec{A}, \quad \vec{E} = -grad\varphi - \frac{1}{c}\frac{\partial \vec{A}}{\partial t}, \quad \Box\vec{A} = -\frac{4\pi}{c}\vec{j}, \quad \Box\varphi = -4\pi\rho$$

$$\frac{1}{c}\frac{\partial \varphi}{\partial t} + div\vec{A} = 0$$

5.

$$\varphi(\vec{r}, t) = \int \frac{dV'}{|\vec{r} - \vec{r}'|}\rho\left(\vec{r}', t - \frac{|\vec{r} - \vec{r}'|}{c}\right)$$

$$\vec{A}(\vec{r}, t) = \frac{1}{c}\int \frac{dV'}{|\vec{r} - \vec{r}'|}\vec{j}\left(\vec{r}', t - \frac{|\vec{r} - \vec{r}'|}{c}\right)$$

6.

$$\vec{d} = \sum_{i=1}^{N} q_i\vec{r}_i, \quad \vec{d} = \int \vec{r}'\rho(\vec{r}')dV, \quad \varphi = \frac{(\vec{r}\vec{d})}{r^3}, \quad \vec{E} = \frac{3\vec{r}(\vec{r}\vec{d}) - r^2\vec{d}}{r^5}, \quad U = -\vec{E}\vec{d}$$

7.

$$\vec{m} = \frac{1}{2c}\int [\vec{r}'\vec{j}(\vec{r}')]dV, \quad \vec{A} = \frac{[\vec{m}\vec{r}]}{r^3}, \quad \vec{H} = \frac{3\vec{r}(\vec{r}\vec{m}) - r^2\vec{m}}{r^5}$$

8.

$$\vec{E}, \vec{H} = \vec{E}_0, \vec{H}_0 exp\left\{-i\left[\omega t - (\vec{k}\vec{r})\right]\right\}, \quad rot\vec{H} = i[\vec{k}\vec{H}], \quad div\vec{H} = i(\vec{k}\vec{H})$$

$$[\vec{k}\vec{H}] = -\frac{\omega}{c}\vec{E}, \quad [\vec{k}\vec{E}] = \frac{\omega}{c}\vec{H}, \quad (\vec{k}\vec{E}) = 0, \quad (\vec{k}\vec{H}) = 0$$

$|\vec{E}| = |\vec{H}|, \quad \vec{k}\perp\vec{E}\perp\vec{H}$ - правая тройка

9.

$$r \gg \lambda, \quad \vec{E}_e = -\frac{\left[\vec{n}[\ddot{\vec{d}}\vec{n}]\right]}{c^2 r}, \quad \vec{H}_e = \frac{[\ddot{\vec{d}}\vec{n}]}{c^2 r}, \quad \frac{dI_e}{d\Omega} = \frac{[\ddot{\vec{d}}\vec{n}]^2}{4\pi c^3}, \quad I_e = \frac{2\ddot{\vec{d}}^2}{3c^3}$$

10.

$$F_r = \frac{2q^2}{3c^3}\dddot{\vec{r}}$$

11.

$$t' = \frac{t - \frac{V}{c^2}x}{\sqrt{1 - \frac{V^2}{c^2}}}, \quad x' = \frac{x - Vt}{\sqrt{1 - \frac{V^2}{c^2}}}, \quad y' = y, \quad z' = z$$

12.

$$V'_x = \frac{V_x - V}{1 - \frac{VV_x}{c^2}}, \quad V'_y = \frac{V_y\sqrt{1-\beta^2}}{1 - \frac{VV_x}{c^2}}, \quad V'_z = \frac{V_z\sqrt{1-\beta^2}}{1 - \frac{VV_x}{c^2}}$$

13.

$$x^{0'} = \frac{x^0 - \beta x^1}{\sqrt{1-\beta^2}}, \quad x^{1'} = \frac{x^1 - \beta x^0}{\sqrt{1-\beta^2}}, \quad x^{2'} = x^2, \quad x^{3'} = x^3$$

$$\{\rho c, j_x, j_y, j_z\}, \quad \{\varphi, A_x, A_y, A_z\}, \quad \left\{\frac{\varepsilon}{c}, p_x, p_y, p_z\right\}, \quad \left\{\frac{\omega}{c}, k_x, k_y, k_z\right\}$$

$$\{ct, x, y, z\}, \quad \{c\gamma, V_x\gamma, V_y\gamma, V_z\gamma\}, \quad \left\{\frac{(\vec{v}\vec{a})\gamma^2}{c^3}; \frac{\vec{a}\gamma^2}{c^2} + \frac{(\vec{a}\vec{v})\vec{v}\gamma^4}{c^4}\right\}$$

14.

$$F_{ik} = \begin{pmatrix} 0 & E_x & E_y & E_z \\ -E_x & 0 & -H_z & H_y \\ -E_y & H_z & 0 & -H_x \\ -E_z & -H_y & H_x & 0 \end{pmatrix}$$

$$E'_x = E_x, \quad H'_x = H_x, \quad E'_y = \frac{E_y - \beta H_z}{\sqrt{1-\beta^2}}, \quad H'_y = \frac{H_y + \beta E_z}{\sqrt{1-\beta^2}}$$

$$E'_z = \frac{E_z + \beta H_y}{\sqrt{1-\beta^2}}, \quad H'_z = \frac{H_z - \beta E_y}{\sqrt{1-\beta^2}}$$

$$I_1 = E^2 - H^2, \quad I_2 = (EH)^2$$

15.

$$\varepsilon = \frac{mc}{\sqrt{1 - \frac{V^2}{c^2}}}, \quad \vec{p} = \frac{m\vec{v}}{\sqrt{1 - \frac{V^2}{c^2}}}, \quad \varepsilon^2 = m^2c^4 + p^2c^2, \quad \vec{v} = \frac{c^2\vec{p}}{\varepsilon}$$

16.

$$\frac{d}{dt}(\vec{p}) = e\vec{E} + \frac{e}{c}[\vec{V}\vec{H}], \quad \frac{dp^k}{dt} = \frac{e}{c}F^{ki}U_i$$

17.

$$\omega = \frac{E^2 + H^2}{8\pi}, \quad \vec{\sigma} = \frac{c}{4\pi}[\vec{E}\vec{H}], \quad \vec{p} = \frac{\vec{\sigma}}{c^2} = \frac{1}{4\pi c}[\vec{E}\vec{H}]$$

18.

$$L = \frac{mc^2}{2}\sqrt{1 - \frac{v^2}{c^2}} - e\varphi + \frac{e}{c}(\vec{v}\vec{A}), \quad \frac{d}{dt}\left(\frac{\partial L}{\partial \dot{q}}\right) - \frac{\partial L}{\partial q} = 0, \quad \frac{d\vec{p}}{dt} = e\vec{E} + \frac{e}{c}[\vec{V}\vec{H}]$$

$$\frac{\partial F_{ik}}{\partial x^n} + \frac{\partial F_{kn}}{\partial x^i} + \frac{\partial F_{ni}}{\partial x^k} = 0, \quad \frac{\partial F^{ik}}{\partial x^k} = -\frac{4\pi}{c}f^i$$

19.

$$\triangle_s\psi = \frac{1}{r^2}\frac{\partial}{\partial r}\left(r^2\frac{\partial\psi}{\partial r}\right) + \frac{1}{r^2\sin\theta}\frac{\partial}{\partial\theta}\left(\sin\theta\frac{\partial\psi}{\partial\theta}\right) + \frac{1}{r^2\sin\theta^2}\frac{\partial^2\psi}{\partial\varphi^2}$$

$$\triangle_c\psi = \frac{1}{r}\frac{\partial}{\partial r}\left(r\frac{\partial\psi}{\partial r}\right) + \frac{1}{r^2}\frac{\partial^2\psi}{\partial\varphi^2} + \frac{\partial^2\psi}{\partial z^2}$$