1) $\operatorname{div}\vec{E} = 4\pi\rho$

$\operatorname{rot}\vec{H} = \frac{\partial\vec{E}}{\partial t} + \frac{4\pi}{c}\vec{J}$

$\operatorname{rot}\vec{E} = -\frac{\partial\vec{E}}{\partial t}$

$\operatorname{div}\vec{H} = 0$

$\vec{F}_л = \frac{e}{c}[\vec{v}\vec{H}] + e\vec{E}$

2) $\oint\limits_S \vec{E}ds = 4\pi\int\limits_V \rho\, dV$

$\oint\limits_L \vec{H} = \int\limits_S \frac{\partial\vec{E}}{\partial t}ds + \frac{4\pi}{c}\int\limits_S \vec{j}\, dS$

$\oint\limits_L \vec{E} = -\int\limits_S \frac{\partial\vec{H}}{\partial t}dS$

$\oint\limits_S \vec{H} = 0$

3) $\frac{\partial\rho}{\partial t} + \operatorname{div}\vec{j} = 0$

$\frac{\partial W}{\partial t} + \vec{j}\vec{E} = -\operatorname{div}\vec{S}$

4) $\vec{E} = -\operatorname{grad}\varphi - \frac{1}{c}\frac{\partial\vec{A}}{\partial t}$

$\vec{H} = \operatorname{rot}\vec{A}$

$\Box\vec{A} = -\frac{4\pi}{c}\vec{j}$

$\Box\varphi = -4\pi\rho$

5) $\varphi = \int \frac{\rho_{t+R/c}}{R}dV + \varphi_0$

$\vec{A} = \frac{1}{c}\int \frac{\vec{j}_{t+R/c}}{R}dV + \vec{A}_0$

6) $\vec{d} = \sum e_i \vec{r}_i$ $\qquad \varphi = \dfrac{(\vec{d}\vec{R}_0)}{R_0^3}$

$\vec{E} = \dfrac{3(\vec{d}\vec{n})\vec{n} - \vec{d}}{R^3}$ $\qquad U = -\vec{E}_0\vec{d}$

7) $\vec{\mu} = \dfrac{1}{2c} \sum e_i [\vec{r}_i \vec{v}_i]$

$\vec{A} = \dfrac{[\vec{\mu}\vec{R}]}{R^3}$ $\qquad \vec{H} = \dfrac{3\vec{n}(\vec{\mu},\vec{n}) - \vec{\mu}}{R^3}$

8) 1. $(\vec{n}\vec{E}) = 0$, $\quad (\vec{n}\vec{H}) = 0$

2. $\vec{S} = \dfrac{E^2}{4\pi} c\vec{n} = \dfrac{c}{4\pi} H^2 \vec{n} = cW\vec{n}$

3. $\vec{H} = [\vec{n}\vec{E}]$

$\vec{k} = \dfrac{\omega}{c}\vec{n}$

9) $\vec{H} = \dfrac{1}{c^2 R} [\ddot{\vec{d}}\vec{n}]$

$\vec{E} = \dfrac{1}{cR} [[\ddot{\vec{d}}\vec{n}]\vec{n}]$

$dI = \dfrac{1}{4\pi c^2} \ddot{\vec{d}}^2 \sin^2\theta \, d\Omega$

$dI = \dfrac{1}{4\pi c^2} [\ddot{\vec{d}}\vec{n}]^2 d\Omega \Rightarrow I = \dfrac{2}{3c^2} \ddot{\vec{d}}^2$

10) $\vec{f} = \dfrac{2e}{3c^3} \dddot{\vec{d}}$

11. $x = \dfrac{x' + vt'}{\sqrt{1-\beta^2}}$, $y = y'$, $z = z'$, $t = \dfrac{t' + \frac{vx}{c^2}}{\sqrt{1-\beta^2}}$

12) $v_x = \dfrac{v_x' + V}{1 + \frac{v_x V}{c^2}}$, $v_y = \dfrac{v_y' \sqrt{1-\beta^2}}{1 + v_x V/c^2}$

$v_z = \dfrac{v_z' \sqrt{1-\beta^2}}{1 + \frac{v_x V}{c^2}}$

13) $(a^k)' = \alpha^k{}_i a^i$

$$\begin{pmatrix} \gamma & -\beta\gamma & 0 & 0 \\ -\beta\gamma & \gamma & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{pmatrix}$$

$u^i = dx^i/d\tau$

$p^i = m u^i$

14. $E_x = E_x'$, $E_y = \dfrac{E_y' + \frac{V}{c} H_z'}{\sqrt{1-\beta^2}}$, $E_z = \dfrac{E_z' - \frac{V}{c} H_y'}{\sqrt{1-\beta^2}}$

$H_x = H_x'$, $H_y = \dfrac{H_y' - \frac{V}{c} E_z'}{\sqrt{1-\beta^2}}$, $H_z = \dfrac{H_z' + \frac{V}{c} E_y'}{\sqrt{1-\beta^2}}$

15. $\mathcal{E} = mc^2\gamma$ $\quad \vec{p} = m\vec{v}\gamma$

$\mathcal{E} = \sqrt{m^2c^4 + p^2c^2}$

16. $\dfrac{d\mathcal{E}}{dt} = e\vec{E}\vec{v}$

$\dfrac{d\vec{p}}{dt} = e\vec{E} + \dfrac{e}{c}[\vec{v}\vec{H}]$

$\dfrac{dp^i}{d\tau} = f^i = \dfrac{e}{c} F^{ik} u_k$

№17.

$$W = \frac{E^2 + H^2}{8\pi} \qquad \vec{g} = \frac{1}{4\pi c}[\vec{E}\vec{H}]$$

$$\vec{S} = \frac{c}{4\pi}[\vec{E}\vec{H}].$$

№18. $$L = -mc^2\sqrt{1-\beta^2} - e\varphi + \frac{e}{c}(\vec{v}\vec{A}).$$

$$\frac{\partial}{\partial x_i}\frac{\partial \Delta}{\partial q_{,i}} - \frac{\partial \Delta}{\partial q} = 0$$

$$e^{iklm}\frac{\partial F_{lm}}{\partial x^k} = 0 \qquad \frac{\partial F^{ik}}{\partial x^k} = -\frac{4\pi}{c}j^i$$

19) $$\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2} + \frac{\partial^2}{\partial z^2}$$

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

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