電磁気学II　前期末試験　R4年8月3日(水)2限実施 模範解答

1. (a) $e = -1.602 \times 10^{-19}\,\mathrm{C}$
   (b) $\varepsilon_0 = 8.854 \times 10^{-12}\,\mathrm{F/m}$
   (c) $\mu_0 = 1.257 \times 10^{-6}\,\mathrm{H/m}$
   (d) $m = 9.109 \times 10^{-31}\,\mathrm{kg}$

2.
$$H = \begin{cases} \dfrac{Jr}{2}\,[\mathrm{A/m}] & (0 < r < a) \\ \dfrac{Ja^2}{2r}\,[\mathrm{A/m}] & (a < r < b) \\ \dfrac{J}{2r}(a^2 + b^2 - r^2)\,[\mathrm{A/m}] & (b < r < c) \\ \dfrac{J}{2r}(a^2 + b^2 - c^2)\,[\mathrm{A/m}] & (r > c) \end{cases} \tag{1}$$

3.
$$H = \begin{cases} 0\,\mathrm{A/m} & \text{コイル外部} \\ nI\,[\mathrm{A/m}] & \text{コイル内部} \end{cases} \tag{2}$$

4. (a) $H = \dfrac{NI}{2\pi R}\,[\mathrm{A/m}]$
   (b) $B = \mu_\mathrm{r}\mu_0 H = \dfrac{\mu_\mathrm{r}\mu_0 NI}{2\pi R}\,[\mathrm{Wb/m^2}]$
   (c) $\Phi = BS = \dfrac{\mu_\mathrm{r}\mu_0 r^2 NI}{2R}\,[\mathrm{Wb}]$
   (d) $R_\mathrm{m} = \dfrac{2R}{\mu_\mathrm{r}\mu_0 r^2}\,[\mathrm{A/Wb}]$

5.
$$H = \begin{cases} 1\,[\mathrm{A/m}] & (r \le a) \\ \dfrac{a}{r}\,[\mathrm{A/m}] & (r > a) \end{cases} \tag{3}$$

6. $H = \dfrac{K}{2}\,[\mathrm{A/m}]$