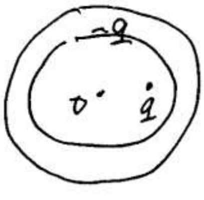
11-12春季闭卷答案

1. $\oint \vec{E}\cdot d\vec{S} = \frac{\sum q_i}{\varepsilon_0}$. Φ_e仅和面内电荷有关，$\vec{E}$和面内外电荷均有关

(D)

2. ~~接……~~ 接地 则外表面电荷为0



球心处电势（电势叠加）

$\frac{q}{4\pi\varepsilon_0 d} - \frac{q}{4\pi\varepsilon_0 R}$ (D)

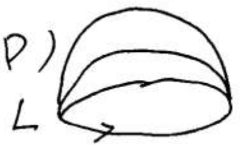
3. $r<R$ $B=\frac{\mu_0 I r}{2\pi R^2}$ $r>R$ $B=\frac{\mu_0 I}{2\pi r}$ (D)

4. $B=\mu_0 nI$ 与半径无关 $B_R=B_r$ (B)

5 (A) 不对 $\vec{H} = \frac{\vec{B}}{\mu_0} - \vec{M}$ $\vec{M}$与磁化电流有关

(B) 不对. $\vec{H}$与环内外传导电流均有关

(C) 正确. $\oint \vec{H}\cdot d\vec{l} = \sum I_0$

(D)


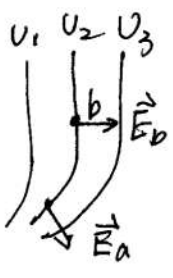
仅当闭合回路 $\oint \vec{H}\cdot d\vec{S} = 0$ 而不同曲面~~……~~各微元法向方向与$\vec{H}$夹角不同（错）

6. 阶段练习三）8 相同. (B)

7. M为电路参数 仅和几何尺寸、介质有关，与电流无关 (C)

8. 由楞次定律可知，(B) 对于两个电元在直径处电流相反抵消，

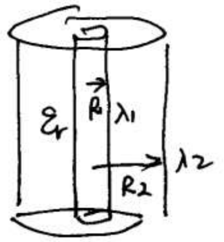
9. 和12-13 (10) 相同.

10.


$U_1>U_2>U_3$

$E_a>E_b$

11.



$$D\cdot 2\pi r\cdot h = \lambda\cdot h$$

$$\therefore D = \frac{\lambda}{2\pi r}$$

$$D = \varepsilon_0\varepsilon_r E \quad \therefore E = \frac{\lambda}{2\pi\varepsilon_0\varepsilon_r r}$$

12. 保持连接. $U_1 = U_2$. $\therefore \frac{E_1}{E_2} = 1$. $D = \varepsilon E$

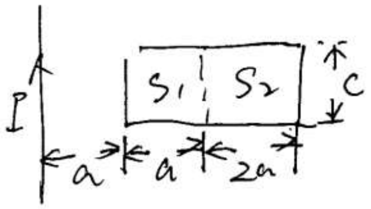
$$\therefore \frac{D_2}{D_1} = \varepsilon_r \quad D = \sigma = \frac{q}{S} \quad \therefore \frac{q_2}{q_1} = \varepsilon_r$$

$$C = \varepsilon_r C_0 \quad \therefore \frac{C_2}{C_1} = \varepsilon_r \quad W = \frac{1}{2}CU^2 \quad \frac{W_2}{W_1} = \frac{C_2}{C_1} = \varepsilon_r.$$

$$\therefore \frac{q_1}{q_2} = \varepsilon_r \quad \frac{E_2}{E_1} = 1 \quad \frac{C_2}{C_1} = \varepsilon_r \quad \frac{W_2}{W_1} = \varepsilon_r$$

13. 和 12-13年. 13 相同.

14.



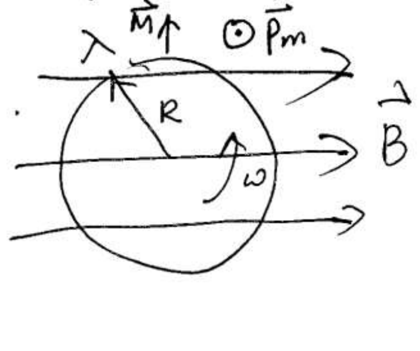
$$\Phi_{s_1} = \int \vec{B}\cdot d\vec{s} = \int_a^{2a} \frac{\mu_0 I}{2\pi r} c\, dr = \frac{\mu_0 I c}{2\pi} \ln 2$$

$$\Phi_{s_2} = \int_{2a}^{4a} \frac{\mu_0 I}{2\pi r} c\, dr = \frac{\mu_0 I c}{2\pi} \ln 2$$

$$\therefore \frac{\Phi_{s_1}}{\Phi_{s_2}} = 1$$

15 磁场叠加. 以向外为正. $B = \frac{\mu_0 I}{2\pi r} - \frac{\mu_0 I}{2R}$ 向里为正. $B = \frac{\mu_0 I}{2r} - \frac{\mu_0 I}{2\pi r}$

16.



$$I_{\text{总}} = \frac{\omega}{2\pi}\cdot\lambda\cdot 2\pi R = \lambda\omega R.$$

$$p_m = I\cdot S = \lambda\cdot\omega R\cdot\pi R^2$$

$$\therefore M = p_m\cdot B = \lambda\omega\pi R^3\cdot B$$

方向 纸面向上.

17. (1) A环无电流. 磁感线无穿过 A环

(2) [redacted] 无感应电流 左右磁通量大小相等符号相反

18 i) $L = \mu\cdot\frac{N^2}{L}\pi R^2$. $\frac{L_1}{L_2} = \frac{\mu_1}{\mu_2}\frac{r_1^2}{r_2^2} = 2\times\frac{1}{4} = \frac{1}{2}.$

ii) $\frac{W_1}{W_2} = \frac{L_1}{L_2}$ $\quad (W = \frac{1}{2}LI^2)$

$= \frac{1}{2}$

19. (1) $\oint \vec{E} \cdot d\vec{l} = -\frac{d\Phi}{dt} = -\oint \frac{\partial \vec{B}}{\partial t} \cdot d\vec{S}$

(2) $\oint \vec{B} \cdot d\vec{S} = 0$

(3) $\oint \vec{D} \cdot d\vec{S} = \Sigma q$