《大学物理 II》期末考试卷 （B）答案

一、单选题 〖每个题 2 分，共计 30 分〗

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
C	B	A	D	A	D	D	C	D	D	D	A	B	B	A

二、填空题 〖每空 3 分，共计 30 分〗

1. 1
2. $\frac{g}{L}$
3. $\frac{\lambda_1+\lambda_2}{2\pi\varepsilon_0 r}$
4. $-B\pi r^2\cos\alpha$
5. $-I$
6. $\frac{4}{3}$
7. 660
8. 亮条纹
9. 7
10. $\frac{hc}{\lambda_0}-\frac{hc}{\lambda}$

三、计算题〖每题各 10 分，共计 40 分〗

1.

$$(T_2-T_1)r=J_2\beta_2$$
$$T_1R=J_1\beta_1$$
$$mg-T_2=ma$$
$$a=r\beta_2$$
$$a=R\beta_1$$
$$a=\frac{mg}{\frac{1}{2}(M_1+M_2)+m}=4m/s^2$$
$$T_1=\frac{1}{2}M_1a=48N$$
$$T_2=mg-ma=60N$$

2. 解：（1）A→B:

$$A_1 = \frac{1}{2}\left(p_B + p_A\right)\left(V_B - V_A\right) = 200J$$

$$\Delta E_1 = \nu C_v \left(T_B - T_A\right) = 3\left(p_B V_B - p_A V_A\right)/2 = 750J$$

$$Q_1 = A_1 + \Delta E_1 = 950J$$

B→C:

$$A_2 = 0$$

$$\Delta E_2 = \nu C_v \left(T_C - T_B\right) = 3\left(p_C V_C - p_B V_B\right)/2 = -600J$$

$$Q_2 = A_2 + \Delta E_2 = -600J$$

C→A:

$$A_3 = p_A\left(V_A - V_C\right) = -100J$$

$$\Delta E_3 = \nu C_v \left(T_A - T_C\right) = \frac{3}{2}\left(p_A V_A - p_C V_C -\right) = -150J$$

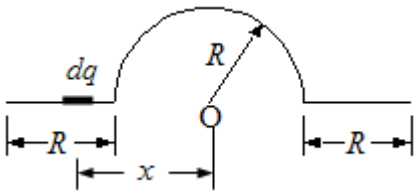
$$Q_2 = A_3 + \Delta E_3 = -250J$$

(2)

$$A = A_1 + A_2 + A_3 = 100J$$

$$Q = Q_1 + Q_2 + Q_3 = 100J$$

3. 解



$$U_1 = \int \frac{dq}{4\pi\varepsilon_0 R} = \int_0^{\pi} \frac{\lambda d\theta}{4\pi\varepsilon_0} = \frac{\lambda}{4\varepsilon_0}$$

$$U_2 = 2\int \frac{dq}{4\pi\varepsilon_0 x} = 2\int_R^{2R} \frac{\lambda dx}{4\pi\varepsilon_0 x} = \frac{\lambda}{2\pi\varepsilon_0}\ln 2$$

$$U = U_1 + U_2 = \frac{\lambda}{2\pi\varepsilon_0}\ln 2 + \frac{\lambda}{4\varepsilon_0}$$

4. 解：　(1)　$\Phi(t)=\iint_S \vec{B}\cdot d\vec{s}=\int \frac{\mu_0 I}{2\pi r} l\,\mathrm{d}r=\frac{\mu_0 I\,l}{2\pi}\int_{a+\upsilon t}^{b+\upsilon t}\frac{\mathrm{d}r}{r}=\frac{\mu_0 I\,l}{2\pi}\ln\frac{b+\upsilon t}{a+\upsilon t}$

(2)　依据法拉第电磁感应定律得　$\varepsilon=-\frac{\mathrm{d}\Phi}{\mathrm{d}t}=\frac{\mu_0 lI}{2\pi}\bullet\frac{(a-b)v}{(b+vt)(a+vt)}\Bigg|$

$$\varepsilon=-\frac{\mathrm{d}\Phi}{\mathrm{d}t}\Bigg|_{t=0}=\frac{\mu_0 lI\upsilon(b-a)}{2\pi ab}$$