G2　物理　解答例

1　　(1)

① $Mg\sin\theta$　② $k\Delta x$　③ $\frac{Mgsin\theta}{k}$　④ $k(l+\Delta x)$　⑤ $-\omega^2 l$

⑥ $-M\omega^2 l = Mgsin\theta - k(l+\Delta x)$　⑦ $\sqrt{\frac{k}{M}}$　⑧ $2\pi\sqrt{\frac{M}{k}}$　⑨ $\Delta x + l$

⑩ $\frac{1}{2}k(l+\Delta x)^2$　⑪ $\frac{1}{2}kx^2 + Mg(l+\Delta x - x)sin\theta + \frac{1}{2}Mv^2$

⑫ $\sqrt{\frac{k}{M}\left\{l^2 - \left(x - \frac{Mgsin\theta}{k}\right)^2\right\}}$　⑬ $\frac{Mgsin\theta}{k}$　⑭ $l\sqrt{\frac{k}{M}}$

(2) $x_C = \frac{M+m}{k}gsin\theta$

(3) $x_D = 0$

2

① $\frac{Q}{S}$ [C/m^2]　② $\frac{Q}{\varepsilon_0 S}$ [V/m]　③ $\frac{Qd}{\varepsilon_0 S}$ [V]　④ $\frac{\varepsilon_0 S}{d}$ [F]　⑤ 0 [V/m]

⑥ $\frac{Qd}{2\varepsilon_0 S}$ [V]　⑦ $\frac{2\varepsilon_0 S}{d}$ [F]　⑧ 2　⑨ $\frac{Q}{2\varepsilon_0 S}$ [V/m]　⑩ $\frac{3}{4}\cdot\frac{Qd}{\varepsilon_0 S}$ [V]

⑪ $\frac{4}{3}\cdot\frac{\varepsilon_0 S}{d}$ [F]　⑫ $\frac{4}{3}$　⑬ $\frac{3}{4}$　⑭ $\frac{4}{5}$　⑮ $\frac{10}{3}$

3

(1) ① $d\sin\theta$　② 偶数　③ $m\lambda$　④ $m\lambda L/d$　⑤ $\lambda L/d$　⑥ 紫

(2) $\lambda = 5.7\times10^{-7}$ [m]

(3) $L = 1.0\times10$[m]

4

(1) $\left(\frac{3}{4}a, \frac{5}{4}a\right)$

(2), (3)

① 0　② mg　③ 0　④ X　⑤ F　⑥ $Fy + mg(x - X)$

⑦ $X - \frac{Fy}{mg}$　⑧ μmg　⑨ $X - \mu y$　⑩ 0　⑪ $\frac{X}{\mu}$　⑫ $\frac{mgX}{y}$

(4) $\frac{5}{12}mg < F < \mu mg$,　$\frac{5}{4}\frac{a}{\mu} < y$ $(\leqq 3a)$