## M.C.Q (9)
## Answers

01)

[2] $X = A_m t + B^2 \rho V$

$A = \frac{X}{mt}$

$[A] = \frac{ML^{-1}T^{-2}}{ML^{-1}T} = T^{-3}$

02) [3]

03)

[3] வேர்னியர் பிரிவொன்றின் நீளம் $\} = \frac{n \times 2x}{pn}$

ஆகச் சிறிய அளவீடு $= \frac{2x}{n} - \frac{2Ix}{pn}$

$= \frac{2x}{n}\left(1 - \frac{x}{p}\right)$ //

04) $\uparrow F = ma$

[3] $55 - 45 = 10\,a$

$a = 1\,ms^{-2}$ //

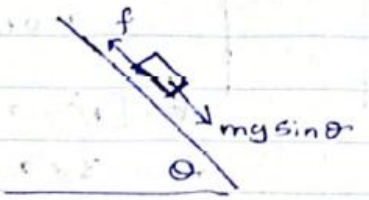
05)

[3]

06) கேட்கக் கூடியதாக இருப்பது நெட்டாங்கு அலையின் அடிப்பை மட்டுமே. விடை (3)

07)

[2]

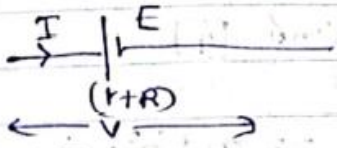



$\eta \frac{AV_0}{d} = mg\sin\theta$

$V_0 = \frac{mgd\sin\theta}{\eta A}$

08)

[1]

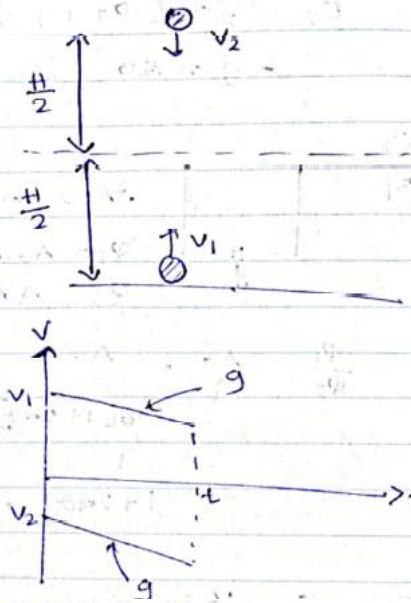



$P = VI$

$\therefore EI = I^2 \times (r+2)$

09)

[4]




$(V_1 + V_2)t = H$

$t = \frac{H}{(V_1+V_2)}$ (C - ✓)

$\uparrow s = ut + \frac{1}{2}at^2$

$\frac{H}{2} = V_2 t + \frac{1}{2}gt^2$

$\frac{H}{2} = V_1 t + \frac{1}{2}gt^2$

$V_2 t - \frac{1}{2}gt^2 = V_1 t + \frac{1}{2}gt^2$

$V_1 - V_2 = gt$

B ⟶ ✓

A ⟶ X

10) விடை (4)

11) [1]

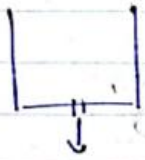
$E_1 = \frac{1}{2} m [3^2 + 4^2 + 5^2]$

$= \frac{1}{2} m \times 50$

$E_2 = \frac{1}{2} m \cdot [0 + 1 + 7^2]$

$= \frac{1}{2} m \, 50$

12) [3]



$V = 2gh$

$\varphi_1 = A_0 V$

$\varphi_2 = AV$

$\frac{\varphi_1}{\varphi_2} = \frac{A_0}{A} = \frac{A_0}{A_0[1 + 2\alpha\theta]}$

$= \frac{1}{1 + 2\alpha\theta}$

[2]

$\frac{T}{A} = \frac{Ye}{l_0}$

$e = \frac{Tl_0}{AY}$ $\quad Y_P > Y_Q$

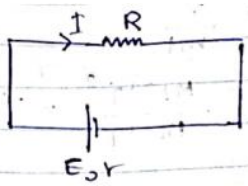
$e_P > e_Q$ $\quad \frac{1}{Y_P} < \frac{1}{Y_Q}$

$\frac{l_P}{A_P} > \frac{l_Q}{A_Q}$

$\frac{Tl_P}{A_P Y_P} > \frac{Tl_Q}{A_Q Y_Q}$

14) விடை (4)

15) [2]




$I_1^2 R_1 = I_2^2 R_2$

$\left[\frac{E}{(R_1 + r)}\right]^2 R_1 = \left[\frac{E}{(R_2 + r)}\right]^2 R_2$

$\frac{R_1}{(R_1 + r)^2} = \frac{R_2}{(R_2 + r)^2}$

$R_1[R_2^2 + 2R_2 r + r^2] = R_2[R_1^2 + 2R_1 r + r^2]$

$r = (R_1 R_2)^{\frac{1}{2}}$

16)

16) [1]

A – ✓

B – ✓

C ✓

D ✗

17)

$A = \pi R^2 - \pi r^2$

$= 0.6R$

$A = 3[R^2 - 0.3R^2]$

$A = 3 \times 0.6 R^2$

$\frac{F}{A} = \frac{Ye}{l}$

$\frac{2 \times 10^4}{A} = \frac{2 \times 10^{11} \times 2 \times 10^{-3}}{3.84}$

$A = 3 \times 0.6 R^2$ ——— (1)

$$A = \frac{2\times10^{4} \times 3.84}{2\times10^{11} \times 2\times10^{-3}}$$ ②

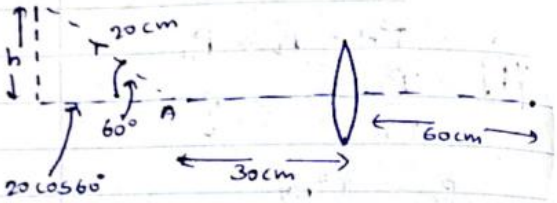
① ⇒ ② ல்

$R = 1\,cm$

T ⇒ பலித ஆர்முடுகல் மீது தங்கி இருப்பதில்லை

18)

4




$\frac{1}{v} - \frac{1}{u} = \frac{1}{f}$ | $\frac{H}{h} = \frac{V}{u}$

$\frac{1}{v} - \frac{1}{30} = -\frac{1}{20}$ | $\frac{H}{10\sqrt{3}} = \frac{40}{40}$

$V = 60\,cm$ | $H = 10\sqrt{3}$

$\frac{1}{v} - \frac{1}{40} = -\frac{1}{20}$ | $V = \sqrt{20^2 + 100\times3}$

$V = 40\,cm$ | $V = 10\sqrt{7}\ cms^{-1}$

19)

3

$M = 1 + \frac{D}{f}$ | $D = 27\,cm$

$3.7 = 1 + \frac{D}{10}$

20)

1

$T = 2\pi\sqrt{\frac{m}{K}}$

21)

1

$20\times50 = 0.2C \times 20$

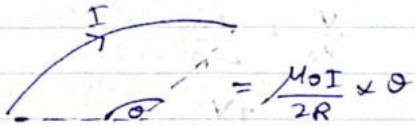
$200\times200 = 0.2L$

$\frac{1}{4} = \frac{200C}{L}$ | $C = 2500$

$\frac{C}{L} = \frac{1}{80}$ | $L = 2\times10^{5}$

22)

3




$= \frac{\frac{\mu_0 I}{2R} \times \theta}{2\pi}$

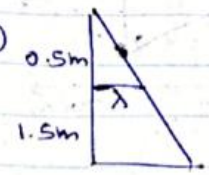
$= \frac{\mu_0 I \theta}{4\pi R}$ //

23)

5

387 Hz

24)




$\frac{\lambda}{3} = \frac{0.5}{2}$

$\lambda = 0.75\,cm$

$V = f\lambda$

$V = 0.75\times10^{-2}\times100$

$= 0.75\,ms^{-1}$ //

25) [5]


$\because F = ma$

$$\frac{GMm}{R^2} = \frac{mv^2}{R}$$

$$v^2 = \frac{G \times \frac{4}{3} \pi R^3 \rho}{R}$$

$$v^2 = \frac{4}{3} \pi G \rho R^2$$

$v \propto R$

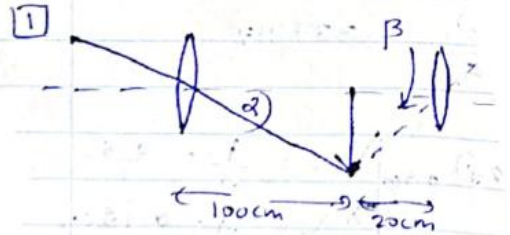
$v_0 \propto 4R$

$$\frac{v}{v_0} = \frac{R}{4R}$$

$v_0 = 4v$ //

26) விடை (1)

27) [1]




$\tan 2^\circ = \frac{d}{100}$

$d = 100 \times 0.03 = 3cm$ //

28) [2]

A → $\frac{660W}{6}$ = 110W

A → $\frac{30W}{6}$ = 5W

4A → 110 × 4 = 440

2A → 10W

440 + 10 = 450W //

29) [1]

$I^2R = P_L + P_H$

$\frac{P_L}{I^2R} \times 100 = \eta$

$P_L = \frac{I^2R\eta}{100}$

$P_H = I^2R - \frac{I^2R\eta}{100}$

$P_H = I^2R \left[1 - \frac{\eta}{100}\right]$

$P_H t = mc\theta$

30) நிலையான சமநிலையிற்கு புவியீர்ப்பு மையம்,மிதப்பு மையத்திற்கு கீழாக இருக்க வேண்டும். விடை (3)

31) [1]

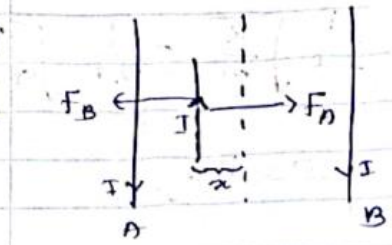
A ✓

B ✗

C ✗

32)

[2]




$$\Delta F = F_A - F_B$$

$$\Delta F = \frac{\mu_0 I}{2\pi(a-x)} \times I l - \frac{\mu_0 I}{2\pi(a+x)} \times I l$$

$$\Delta F = \frac{\mu_0 I^2 l}{2\pi} \left( \frac{a+x-a+x}{a^2-x^2} \right)$$

$$\Delta f = \frac{\mu_0 I^2 l}{2\pi} \times \frac{2x}{a^2}$$

$$\Delta F = \left( \frac{\mu_0 I^2 l}{\pi a^2} \right) x$$

$$\overrightarrow{F} = ma$$

$$-\left[ \frac{\mu_0 I l}{\pi a^2} \right] x = ma$$

$$a = -\left[ \frac{\mu_0 I^2 l}{\pi m a^2} \right] x$$

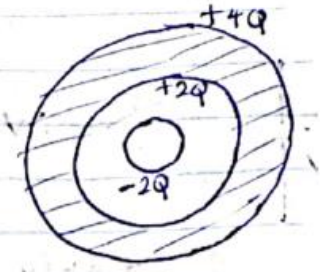
$$T = \frac{2\pi}{\sqrt{\frac{\mu_0 I^2 l}{\pi m a^2}}}$$

$$T = \frac{2\pi}{I} \sqrt{\frac{\pi m a^2}{\mu_0 l}}$$

$$= \frac{2\pi a}{I} \sqrt{\frac{\pi \theta}{\mu_0}}$$

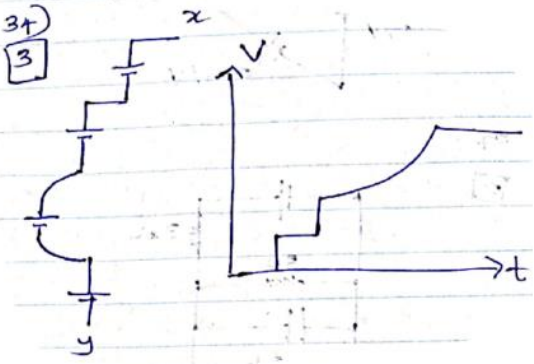
33)

[5]



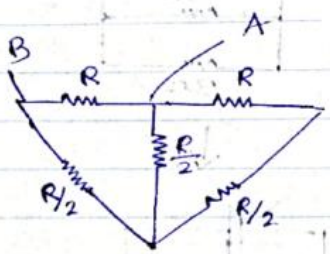

34)

[3]



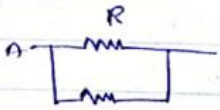
35)

[1]




$$\frac{\frac{3}{2}R \times \frac{R}{2}}{\frac{3}{2}R + \frac{R}{2}} = \frac{3R^2/4}{4R/2} = \frac{3R}{8}$$

$$\frac{3R}{8} + \frac{R}{2} = \frac{7R}{8}$$

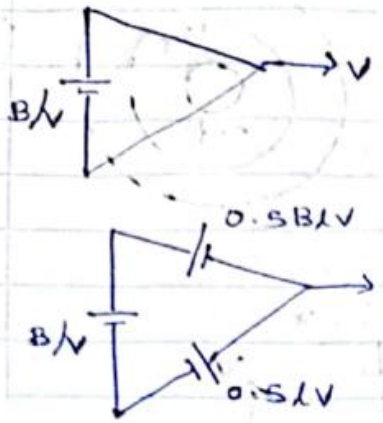



$$\frac{1}{R} + \frac{8}{7R} = \frac{1}{R'}$$

$$\frac{1}{R'} = \frac{15}{7R}$$

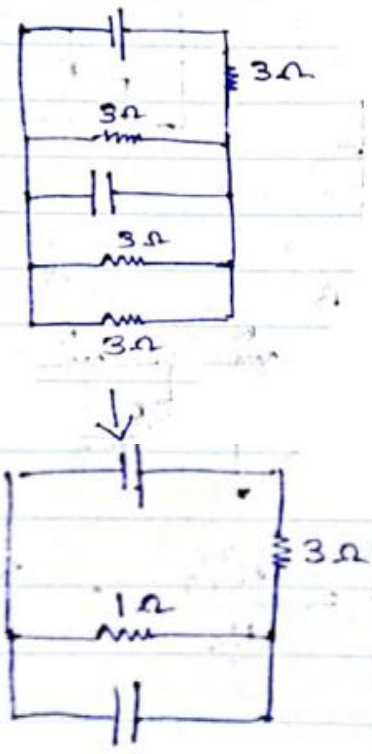
36)

[3]




37)

[2]

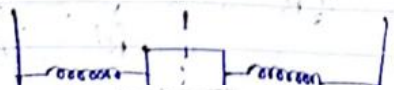



$$Q = CV$$

$$Q = 2 \times 2.5$$

$$Q = 5\mu C$$ //

38)



$$f = \frac{1}{2\pi}\sqrt{\frac{K}{m}} = \frac{1}{2\pi}\sqrt{\frac{9}{9\times10^{-2}}}$$

$$f = 5 \text{ Hz}$$

39) [1]

40)

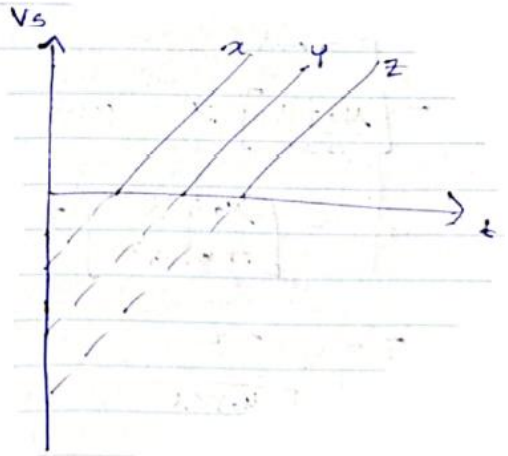
[1] $hf = \phi + E_K$

$$hf = \phi + V_{se}$$

$$V_{se} = hf - \phi$$

$$V_s = \left(\frac{h}{e}\right)f - \frac{\phi}{e}$$

$$Y = mx - c$$




41)

[2] $Vt = (0.15\times4000\times75) + (50\times10^{-3}\times2\times10^{5}) + (50\times10^{-3}\times4\times10^{3}\times100) + 0.2\times3\times10^{6}$

$$270\times I\times1200 =$$

$$I' = 2A$$

42)

$\Delta u = xAdg$

[2] $\Delta u = -xAdg$

$\uparrow F = ma$

$$-xAdg = \left(Ad\frac{d}{2}\right)a$$

$$a = -\left(\frac{2g}{h}\right)x$$

$$\omega^2 = \frac{2g}{h}$$

$$T = \frac{2\pi}{\omega} = \frac{2\pi}{\sqrt{\frac{2g}{h}}} = 2\pi\sqrt{\frac{h}{2g}}$$

$$T = \frac{1}{2\pi}\sqrt{\frac{h}{2g}}$$

43) [1]

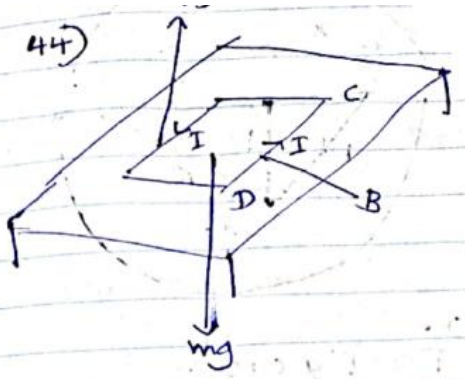
| A | B | $\tau = \tau'$ |
|---|---|---|
| 4N | N | $BINA = C\theta$ |
| A | A | |
| 8R | R | $\theta = \frac{BINA}{C}$ |
| B | B | |

$\theta \propto N$

$\frac{4}{\theta} = \frac{4}{1}$

$\theta = 1$

44)



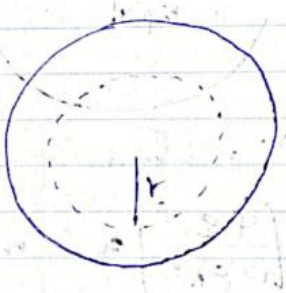

$F_B \times a = mg \times \frac{a}{2}$

$F_B = \frac{mg}{2}$

$BIa = \frac{mg}{2}$

$I = \frac{mg}{2Ba}$ //

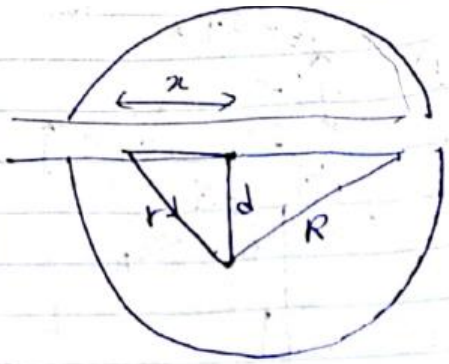
45) [2]




$EA = \frac{\phi}{\varepsilon_0}$

$E \times 4\pi r^2 = \frac{\varphi}{\frac{4}{3}\pi R^3} \times \frac{4}{3}$

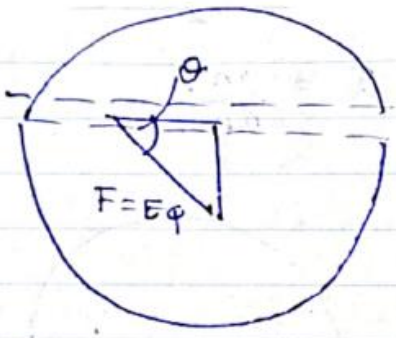
$E = \frac{\varphi}{4\pi\varepsilon_0 R^3} r$




$\vec{F} = Eq\cos\theta$

$\vec{F} = \frac{\varphi}{4\pi\varepsilon_0 y^3} rq \frac{x}{r}$

$\vec{F} = -\left[\frac{\varphi q}{4\pi\varepsilon_0 R^3}\right] x$




$\rightarrow \therefore F = ma$

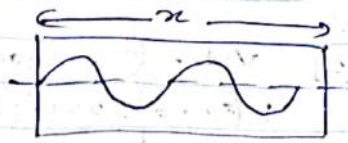
$$-\left[\frac{\Phi q}{4\pi\varepsilon R^3}\right] x = ma$$

$$a = \left[\frac{\Phi q}{4\pi\varepsilon m R^3}\right] x$$

$$\omega^2 = \frac{\Phi q}{4\pi\varepsilon m R^3} \qquad T = \frac{2\pi}{\omega}$$

$$\omega = \sqrt{\frac{\Phi q}{4\pi\varepsilon m R^3}} \qquad T = 2\pi\sqrt{\frac{4\pi\varepsilon m R^3}{\Phi q}}$$

46) [4]




$1 \times c = nV$

$$V = \frac{c}{n} \qquad N = \frac{x f n}{c}$$

$$f\lambda = \frac{c}{n} \qquad N = \frac{x f n}{c}$$

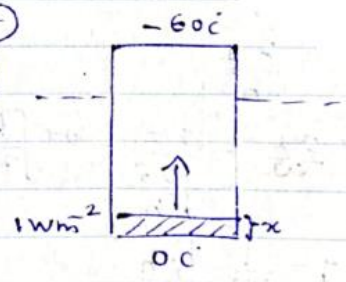
$$\lambda = \frac{c}{fn}$$

$$N_A = 2(N_B + N_C)$$

$$\frac{x f n}{c} = 2\left(\frac{x f \times 1.5}{c} + \frac{x f \times 2}{c}\right)$$

$n = 7$

47) [3]




$$\frac{Q}{t} = KA\frac{\Delta\theta}{d}$$

$$\frac{Q}{t} = 2 \times 1 \times \frac{60}{40}$$

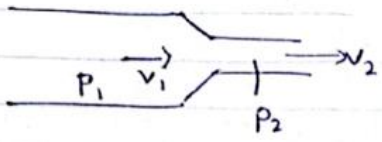
$$= 1.5\ \mathrm{W m^{-2}}$$

$0.5\ \mathrm{W m^{-2}} \times 3600 \times 24 \times 3$

$= (\pi \times 1 \times 900) 3.6 \times 10^5$

$x = 1.6\ \mathrm{mm}$

48) [4]




$$P_1 + \frac{1}{2}\rho V_1^2 = P_2 + \frac{1}{2}\rho V_2^2$$

$$P_1 - P_2 = \frac{1}{2}\rho\left(V_1^2 - V_2^2\right)$$

$$A_1 V_1 = A_2 V_2$$

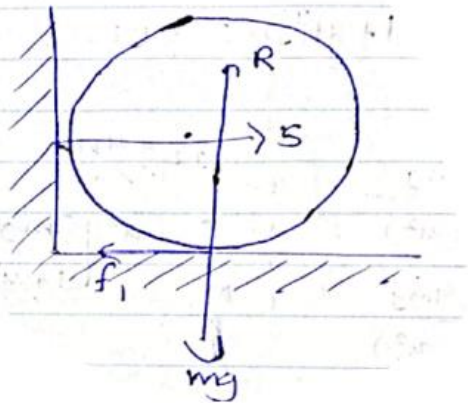
$$V_1 = \frac{A_2 V_2}{A_1}$$

$$P_1 - P_2 = \frac{1}{2}\rho\left[V_2^2 - \left(\frac{A_1}{A_2}\right)^2 V_2^2\right]$$

$$Q = A_2 V_2$$

50)

1




$$\tau = (f_1 R + f_2 R)$$

$$\tau\theta = \frac{1}{2} I \omega_0^2$$

$$\tau\,(2\pi N) = \frac{1}{2} I \omega_0^2$$

$$\uparrow \quad R + T_2 = mg$$

$$R = mg - T_2$$

$$R = mg - \mu S$$

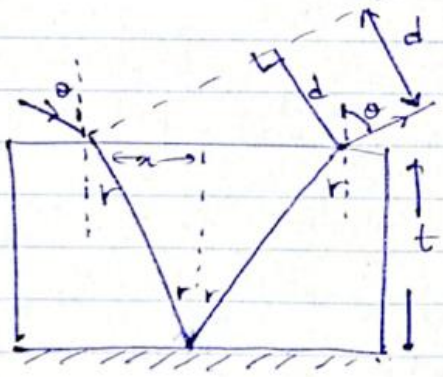
$$f_1 = S$$

$$f_1 = \mu R$$

$$S = \mu R$$

49)

1



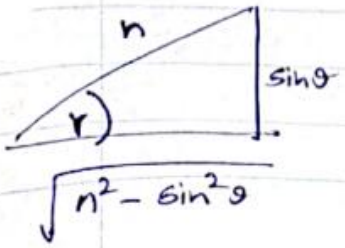

$$d = AB\cos\theta$$

$$\tan r = \frac{x}{t}$$

$$d = 2t \cdot \tan r \cos\theta \quad \text{——} (1)$$

$$1\sin\theta = n\sin r$$

$$\sin r = \frac{\sin\theta}{n}$$




$$\sqrt{n^2 - \sin^2\theta}$$

$$\tan r = \frac{\sin\theta}{\sqrt{n^2 - \sin^2\theta}}$$

1) இல் பிரதியிடுவதால்

$$d = 2t \cdot \frac{\sin\theta}{\sqrt{n^2 - \sin^2\theta}} \cos\theta$$

$$R = mg - \mu\mu R$$

$$R(1+\mu^2) = mg$$

$$R = \frac{mg}{(1+\mu^2)} \qquad f_2 = \mu\mu R$$

$$f_2 = \mu^2 \left[\frac{mg}{1+\mu^2}\right]$$

$$f_1 = \frac{\mu mg}{(1+\mu^2)}$$

$$\left[\frac{\mu mg}{(1+\mu^2)} + \frac{\mu^2 mg}{(1+\mu^2)}\right] R \times 2\pi N = \frac{1}{2} \times \frac{1}{2} \times mR^2\alpha$$

$$N = \frac{(1+\mu^2) R \omega_0^2}{8\pi\mu g (1+\mu)}$$