NUMERICAL 10TH

CHAPPTER # 10

10.1

T = 2s

g_e = 10m/s

$g_m = g_e/6 = 10/6$

=1.67m/s

L = ?

$T = 2\pi\sqrt{l/g}$

$T^2 = [2\pi\sqrt{l/g}]^2$

$T^2 = 4\pi^2 xL/g$

$L = T^2 xg/4\pi^2$

زمین کے لیے لمبائی

$L = (2)^2 10/4(3.14)^2$

$= 10/9.8596$

$= 1.02m$

چاند کے لیے لمبائی

$L=(2)^2 1.67/4(3.14)^2$

$= 1.67/9.8596$

$= 0.17m$

10.2

L = 0.99m

T = 4.9s

$T = 2\pi\sqrt{l/g}$

$T^2 = [2\pi\sqrt{l/g}]^2$

$T^2 = 4\pi^2 xL/g$

$g = 4\pi^2 xL/T^2$

$=4(3.14)^2 x0.99/(4.9)^2$

$=4(9.8596)(0.99)/24.01$

$g = 1.63m/s^2$

10.3

L = 1m

g_e = 10m/s

g_m =1.67m/s

$T = 2\pi\sqrt{l/g}$

زمین کی سطح پر ٹائم پیریڈ

$T = 2(3.14)\sqrt{1/10}$

$= 6.28\sqrt{0.1} = 2s$

چاند کی سطح پر ٹائم پیریڈ

$T = 2(3.14)\sqrt{1/1.6}$

$= 6.28\sqrt{0.598}$

$= 4.9s$

10.4

T = 2s

$g = 10m/s^2$

$L = T^2 xg/4\pi^2$

$=(2)^2 x10/4(3.14)^2$

L = 1.02m

10.5

t = 20s

ویوز کی تعداد = n = 100

λ = 6cm = 0.06m

f = وقت / ویوز کی تعداد =n/t

f = 100/20 = 5Hz

T = 1/f

= 1/5 = 0.2s

V = fλ

= 5x0.06 = 0.3m/s

10.6

f = 12Hz

λ = 3cm = 0.03m

V = fλ

= 12x0.03=0.36m/s

10.7

f = 190Hz

S = 90m

t = 0.5s

(a) T = 1/f

T = 1/190 = 0.005s

(b) V = S/t

V = 90/0.5=180m/s

(c) λ = V/f

λ = 180/190=0.95m

10.8

f = 4.8Hz

λ = 6cm = 0.06m

(a) V = fλ

V = 4.8x0.06

= 0.29m/s

(b) T = 1/f

T = 1/4.8 = 0.21s

10.9

f = 5Hz

λ = 40mm

$= 40x10^{-3}m$

S = 80cm = 0.8m

V = fλ

$= 5x40x10^{-3}$

= 0.2m/s

t = S/V (S=Vt)

= 0.8/0.2 = 4s

10.10

f = 90MHz

$= 90x10^6$Hz

$V = 3x10^8$m/s

λ = V/f

$= 3x10^8/90x10^6$

= 3.33m

CHAPPTER # 11

11.1

$I = 3x10^{-6}W/m^2$

$I_o = 10^{-12}W/m^2$

$S.L = 10\log I/I_o$(dB)

$= 10\log(3x10^{-6}/10^{-12})$

$= 10\log(3x10^6)$

$= 10[\log3+\log10^6]$

$= 10[\log3+6\log10]$

$= 10[0.4771+6(1)]$

= 64.771 = 64.8dB

(b) S.L = 100dB

$S.L = 10\log I/I_o$(dB)

$100 = 10\log I/10^{-12}$

$10 = \log I/10^{-12}$

دونوں طرف انٹی لاگ لیا

$10^{10} = I/10^{-12}$

$10^{10}x10^{-12} = I$

$10^{-2} = I$

$I = 0.01W/m^2$

11.2

S.L = 80dB

$I_o = 10^{-12}W/m^2$

$S.L = 10\log I/I_o$(dB)

$80 = 10\log I/10^{-12}$

$8 = \log I/10^{-12}$

دونوں طرف انٹی لاگ لیا

$10^8 = I/10^{-12}$

$10^8x10^{-12} = I$

$I = 10^{-4}W/m^2$

11.3

V = 330m/s

λ = 5cm = 0.05m

V = fλ

330 = f x 0.05

f = 330/0.05

$= 6.6x10^3$Hz

قابل سماعت ہے

11.4

n = 72

t = 60s

(a) f = n/t

= 72/60 = 1.2Hz

(b) T = 1/f

= 1/1.2 = 0.83s

11.5

T = 1.5s

t = 1.5/2 = 0.75s

V = 1500m/s

S = Vt

= 1500x0.75

= 1125m

11.6

T = 5s

t = 5/2 = 2.5s

V = 346m/s

S = Vt

= 346x2.5

= 865m

11.7

T = 3.42s

t = 3.42/2 = 1.71s

V = 1531m/s

S = Vt

= 1531x1.71

= 2618m

11.8

V = 343m/s

f = 20000Hz

(a) V =fλ

343 = 20000 x λ

λ = 343/20000

$\lambda = 1.7x10^{-2}$m

(b) V =fλ

343 = 20 x λ

λ = 343/20 = 17.2m

11.9

f = 2kHz

= 2000Hz

λ = 35cm = 0.35m

S = 1.5km =1500m

V = fλ

= 2000x0.35

= 700m/s

t = S/V (S=Vt)

= 1500/700 = 2.1s

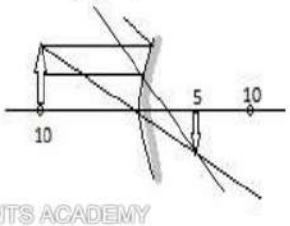
CHAPPTER # 12

12.1

p = 10cm

q = -5cm

اینچ مرر کے پیچھے



$1/f = 1/p + 1/q$

$= 1/10 + 1/(-5)$

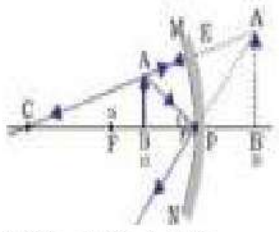
f = -10cm (div-m)

12.2

O = 30cm

p = 10.5cm

f = 16cm



$1/f = 1/p + 1/q$

$1/16 = 1/10.5 + 1/q$

$1/q = 1/16 - 1/10.5$

$=(10.5-16)/16x10.5$

$1/q = -168/5.5$

q = 30.54cm (con-m)

$I/O = q/p$

$I/30 = 30.54/10.5$

I = 87.26cm

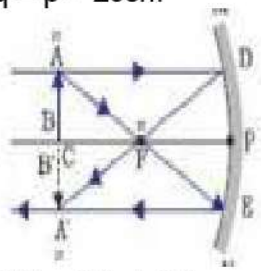
p = 20cm **12.3**

I/O = q/p

I/I = q/p

1 = q/p

q = p = 20cm



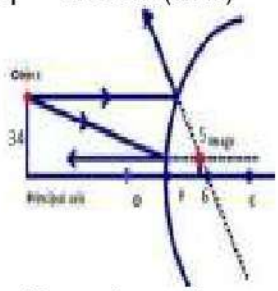
$1/f = 1/p + 1/q$

= 1/20 + 1/20

f = 10cm

p = 34.4cm **12.4**

q = -5.66cm (div-m)



$1/f = 1/p + 1/q$

= 1/34.4 + 1/(-5.66)

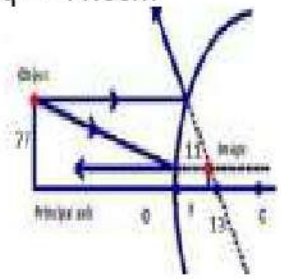
=(5.66-34.4)/34.4x5.66

f = -194.7/28.74

= -6.77cm (div-m)

f = -13.5cm **12.5**

q = -11.5cm



$1/f = 1/p + 1/q$

1/(-13.5)=1/p+1/(-11.5)

1/p = 1/11.5-1/13.5

=(13.5-11.5)/11.5x13.5

p = 155.25/2

= 77.62cm

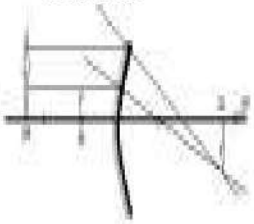
f = -8.70cm **12.6**

O = 13.2cm

p = 19.3cm

p = 2p = 2(19.3)

= 38.4cm



$1/f = 1/p + 1/q$

1/(-8.70)=1/19.3+1/q

1/q =1/8.70+1/19.3

=(19.3-8.70)/8.70x19.3

q = 167.91/10.6

= 15.84

(b) I/O = q/p

I/13.2 = 16.84/19.3

I = 10.8cm

(c) I/O = q/p

I/13.2 = 15.84/38.4

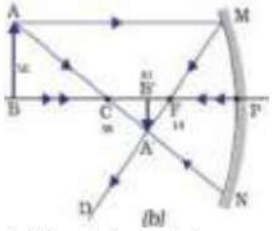
I = 5.42cm

R = 38cm **12.7**

f = R/2 = 38/2

= 19cm

p = 50cm



$1/f = 1/p + 1/q$

1/19 = 1/50 + 1/q

1/q = 1/19-1/50

= (50-19)/19x50

q = 950/31

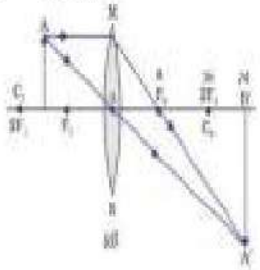
= 30.64cm

امیج سیدھی ہو گی

O = 4cm **12.8**

p = 12cm

f = 8cm



$1/f = 1/p + 1/q$

1/8 = 1/12 + 1/q

1/q = (6-4)/48

q = 24cm

(b) I/O = q/p

I/4 = 24/12

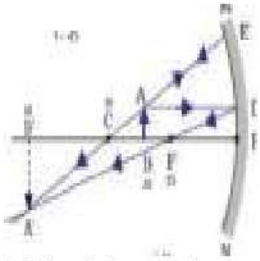
I = 8cm

امیج، ریئل، الٹی، بڑی

O = 10cm **12.9**

p = 20cm

f = -15cm



$1/f = 1/p + 1/q$

1/(-15) = 1/20 + 1/q

1/q = (-4-3)/60

q = -8.75cm

I/O = q/p

I/10 = 8.75/20

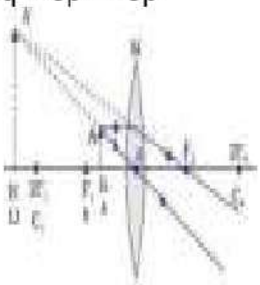
I = 4.28cm

امیج، ورچوئل، سیدھی، بڑی

f = 6cm **12.10**

q/p = 3/1

q = 3p = -3p



$1/f = 1/p + 1/q$

1/6 = 1/p + 1/(-3p)

p = 4cm

$i = 35^0$ **12.11**

n = 1.25

(a) n = Sin$i$/Sin$r$

1.25 = Sin35^0/ Sin$r$

Sin$r$ = 0.57/1.25

Sin$r$ = 0.45

$r = \text{Sin}^{-1}(0.45)$

$r = 27.32^0$

(b) n = Sin$i$/Sin$r$

1.25 = Sin$c$/Sin90^0

Sin$c$ = Sin90^0/1.25

Sin$c$ = 0.80

$c = \text{Sin}^{-1}(0.80)$

$= 53.13^0$

P = 5D **12.12**

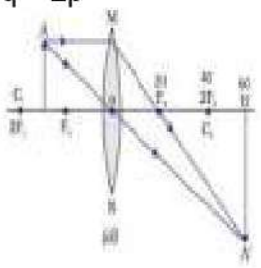
f = 1/P

= 1/5 = 0.2m

f = 20cm

q/p = 2/1

q = 2p



$1/f = 1/p + 1/q$

1/20 = 1/p + 1/2p

p = 30cm

CHAPPTER # 13

Q = 100μC **13.1**

= 100x10^{-6}C=10^{-4}C

e^- = 1.6x10^{-19}C

n = Q/e (Q=ne)

= 10^{-4}/1.6x10^{-19}

= 0.625x10^{-4+19}

n = 6.25x10^{14}

q_1 = 10μC **13.2**

= 10x10^{-6}C = 10^{-5}C

q_2 = 5μC = 5x10^{-6}C

r = 150cm = 1.5m

k = 9x10^9Nm^2/C^2

$F = kq_1q_2/r^2$

$= \frac{9\times10^{9}\times10^{-5}\times5\times10^{-6}}{(1.5)^2}$

= 45x10^{9-5-6}/2.25

F = 20x10^{-2} = 0.2N

دفع کی فورس، مثبت چارجز

F = 0.8N **13.3**

r = 0.1m

k = 9x10^9Nm^2/C^2

$F = kq_1q_2/r^2$

0.8=9x10^9xq^2/(0.1)^2

q^2 = 0.8x0.01/9x10^9

= 8x10^{-3}/9x10^9

= 0.888x10^{-12}

$\sqrt{q^2}=\sqrt{0.88}\times\sqrt{(10^{-6})^2}$

q = 0.942x10^{-6}

= 9.42x10^{-7}C

F = 0.1N 13.4
r = 5cm = 0.05m
$k = 9x10^9 Nm^2/C^2$
$F = kq_1q_2/r^2$
$q^2 = Fr^2/k$
$= 0.1x(0.05)^2/9x10^9$
$=0.1x0.0025x10^{-9}/9$
$q^2 = 2.8x10^{-5}x10^{-9}$
$= 2.8x10^{-14}C$
Now if
r = 2cm = 0.02m
$q^2 = 2.8x10^{-14}C$
$F = kq_1q_2/r^2$
$= \frac{9x10^9x2.8x10^{-14}}{(0.02)^2}$
$=(25.2/0.0004)x10^{9-14}$
$= 63000x10^{-5}$
F = 0.63N

$V = 10^4V$ 13.5
q = 100μC
$= 100x10^{-6} = 10^{-4}C$
V = W/q
$10^4 = W/10^{-4}$
$W = 10^4x10^{-4} = 10^0$
W = 1J

q = +2C 13.6
V_a = 100V
V_b = 50V
$W = q(V_a-V_b)$
= 2(100-50) = 100J

V_b = 9V 13.7
Q = 0.06C
Q = CV
0.06 = 9 x C
$C = 0.06/9$
$= 6.67x10^{-3}F$

Q_1 = 0.03C 13.8
V_1 = 6V
Q_2 = 2C
C = C
$Q_1/V_1 = Q_2/V_2$
$V_2 = Q_2xV_1/Q_1$
$= 2x6/0.03 = 400V$

C_1 = 6μC 13.9
C_2 = 12μC
V = 12V
$1/C_{eq} = 1/C_1 + 1/C_2$
$= 1/6 + 1/12 = 4μC$
سیریز میں تمام کپیسٹرز پر چارج ایک جیسا ہوگا
$Q = C_{eq}V$
$= 4x10^{-6}x12$
$=48x10^{-6} = 48μC$
$V_1 = Q/C_1$
$= 48x10^{-6}/6x10^{-6}$
= 8V
$V_2 = Q/C_2$
$= 48x10^{-6}/12x10^{-6}$
= 4V

C_1 = 6μC 13.10
C_2 = 12μC
V = 12V
$C_{eq} = C_1 + C_2$
= 6+12 = 18μF
پیرالل میں ہر کپیسٹرز پر پوٹینشل ایک جیسا ہوگا
p.d = 12V
$Q_1 = C_1V$
$= 6μx12 = 72μC$
$Q_2 = C_2V$
$= 12μx12 = 144μC$

CHAPPTER # 14

I = 3mA 14.1
$= 3x10^{-3}A$
t = 1mint = 60s
I = Q/t
$3x10^{-3} = Q/60$
$Q = 60x3x10^{-3}$
$= 180x10^{-3}C$

خشک جلد سے کرنٹ
R = 100000Ω
V = 12V
V = IR
$12 = I x 10^5$
$I = 12/10^5$
$= 1.2x10^{-4}A$
گیلی جلد سے کرنٹ
R = 1000Ω
V = 12V
V = IR
12 = I x 1000
I = 12/1000
$= 1.2x10^{-2}A$

R = 10MΩ 14.2
$= 10x10^6Ω$
V = 100V
V = IR
$100 = I x 10^7$
$I = 100/10^7 = 1/10^5$
$= 1/10^2x10^3$
$= (1/100)x10^{-3}$
$= 0.01mA$

V = 10V 14.3
I = 1.5A
t = 2mint = 120s
R = V/I = 10/1.5
= 6.667Ω
$W = I^2Rt$
$= (1.5)^2x6.667x120$
W = 1800J

R_1 = 2kΩ 14.4
R_2 = 8kΩ
V = 10V
(a) $R_e = R_1 + R_2$
= 2+8 = 10kΩ
(b) سیریز میں ہر رزسٹنس پر کرنٹ ایک جیسا ہوگا
$V = IR_e$
$10 = I x 10x10^3$
$I = 1x10^{-3} = 1mA$
(c) $V_1 = IR_1$
$= 1x10^{-3}x2x10^3$
= 2V
$V_2 = IR_2$
$= 1x10^{-3}x8x10^3$
= 8V

R_1 = 6kΩ 14.5
R_2 = 12kΩ
V = 6V NTS ACADEMY
(a) $1/R_e=1/R_1+1/R_2$
$= 1/6+1/12 = 4kΩ$
(b) پیرالل میں ہر رزسٹنس کے گرد پوٹینشل ایک جیسا ہوگا
V = 6V
(c) $V = I_1R_1$
$6 = I_1 x 6x10^3$
$I_1 = 6/6x10^3 = 1mA$
$V = I_2R_2$
$6 = I_2 x 12x10^3$
$I_2 = 6/1210^3 = 0.5mA$

V = 220V 14.6
P = 100W
Hours = 5
Days = 30
t = 5x30 = 150h
P = VI = V(V/R)
$P = V^2/R$
$100 = (220)^2/R$
$R = 48400/100$
$= 484Ω$
E = PxHours/1000
= 100x150/1000
= 15kWh

P = 150W 14.7
R = 95Ω
P = VI = V(V/R)
$P = V^2/R$
$150 = V^2/95$
$V^2 = 150x95$
$V^2 = 14250$
$\sqrt{V^2} = \sqrt{14250}$
V = 120V

بلبوں کے صرف شدہ یونٹس
$P = 10x60 = 600W$
$t = 5x30 = 150h$
$E_b = Pxh/1000$
$= 600x150/1000$
=90kWh 14.8
پنکھوں کے صرف شدہ یونٹس
$P = 4x75 = 300W$
$t = 10x30 = 300h$
$E_p = Pxh/1000$
$= 300x300/1000$
= 90kWh
ٹی وی کے صرف شدہ یونٹس
$P = 1x250 = 250W$
$t = 2x30 = 60h$
$E_t = Pxh/1000$
$= 250x60/1000$
= 15kWh
استری کے صرف شدہ یونٹس
$P =1x1000=1000W$
$t = 2x30 = 60s$
$E_i = Pxh/1000$
$= 1000x60/1000$
= 60kWh
$U_T = E_b+E_p+E_t+E_i$
$= 90+90+15+60$
= 225kWh
فی یونٹس قیمت = Rs = 4
بل = 4x225=1020/-

بلب کے کرنٹ، رزسٹنس
P = 100W 14.9
V = 250V
(a) P = VI
100 = 250 x I
I = 100/250 = 0.4A
(b) V = IR
250 = 0.4xR
NTS ACADEMY

$R = 250/0.4 = 625\Omega$

ہیٹر کے کرنٹ، رزسٹنس

$P = 4kW = 4000W$

$V = 250V$

(a) $P = VI$

$4000 = 250 \times I$

$I = 4000/250 = 16A$

(b) $V = IR$

$250 = 16 \times R$

$R = 250/16 = 15.6\Omega$

$R = 5.6\Omega$ 14.10

$V = 3V$

$I = 0.5A$

(a) $P_r = I^2R$

$= (0.5)^2 \times 5.6$

$= 1.4W$

(b) $P_b = VI$

$= 3 \times 0.5$

$= 1.5W$

(c) کچھ پاور بیٹری کے اندرونی رزسٹنس کی وجہ سے ضائع ہو جاتی ہے

CHAPPTER # 15

$V_p = 240V$ 15.1

$V_s = 12V$

$N_p = 2000$

$N_s/N_p = V_s/V_p$

$N_s/2000 = 12/240$

$N_s = 12 \times 2000/240$

$= 100$

$N_p = 1$ 15.2

$N_s = 100$ (step-up)

$V_p = 20V$

$N_s/N_p = V_s/V_p$

$100/1 = V_s/20$

$V_s = 100 \times 20/1$

$= 2000V$

$N_p = 100$ 15.3

$N_s = 1$ (step-down)

$V_p = 170V$

$I_p = 1mA = 1 \times 10^{-3}A$

$N_s/N_p = V_s/V_p$

$1/100 = V_s/170$

$V_s = 1 \times 170/100$

$= 1.7V$

ان پٹ پاور=آوٹ پٹ پاور

$V_sI_s = V_pI_p$

$1.7 \times I_s = 170 \times 1 \times 10^{-3}$

$I_s = 170 \times 10^{-3}/1.7$

$= 0.1A$

$V_p = 240V$ 15.4

$V_s = 12V$

$N_p = 4000$

$I_s = 0.4A$

$N_s/N_p = V_s/V_p$

$N_s/4000 = 12/240$

$N_s = 12 \times 4000/240$

$= 200$

ان پٹ پاور=آوٹ پٹ پاور

$V_sI_s = V_pI_p$

$12 \times 0.4 = 240 \times I_p$

$I_p = 12 \times 0.4/240$

$= 0.02A$

$P = 500MW$ 15.5

$= 500 \times 10^6W$

$V = 250kV$

$= 250 \times 10^3V$

$P = VI$

$500 \times 10^6 = 250 \times 10^3 I$

$I = 500 \times 10^6/250 \times 10^3$

$= 2 \times 10^3A$

$P_{gen} = 150kW$ 15.6

$= 150 \times 10^3W$

$V_{wire} = 10000V$

$R = 2\Omega$

$S = 5km = 5000m$

تار میں پاور جنریٹر کی وجہ سے

$P_{gen} = P_{wire}$

$150 \times 10^3 = V_wI_w$

$150 \times 10^3 = 10000 \times I_w$

$I_w = 150 \times 10^3/10000$

$= 15A$

تار میں ضائع ہونے والا وولٹیج یا وولٹیج ڈراپ

$V_d = I_w R$

$= 15 \times 2 = 30V$

تار میں ضائع ہونے والی پاور

$P_{loss} = V_d I_w$

$= 30 \times 15 = 450W$

شہر کے ٹرانسارمر کو تار سے جو وولٹیج ملا

$V_T = V_{in} - V_d$

$= 10000 - 30$

$= 9970V$

CHAPPTER # 18

$T_{1/2} = 7.3s$ 18.1

$T_p = 29.2s$

$T_p = nT_{1/2}$

$29.2 = n \times 7.3$

$n = 29.2/7.3 = 4$

$N = N_0/2^n$

$= N_0/2^4 = N_0/16$

سولہ واں حصہ باقی رہ جائے گا

$T_{1/2} = 5.25Y$ 18.2

$T_p = 26Y$

$T_p = nT_{1/2}$

$26 = n \times 5.25$

$n = 26/5.25 = 5$

$N = N_0/2^n$

$= N_0/2^5 = N_0/32$

بتیس واں حصہ باقی رہ جائے گا

$T_{1/2} = 5730Y$ 18.3

اصل مقدار $= N_0$

باقی مقدار $= N = N_0/8$

$N = N_0/2^n$

$N_0/8 = N_0/2^n$

$1/2^3 = 1/2^n$

$2^3 = 2^n$

$n = 3$

$T_p = nT_{1/2}$

$= 3 \times 5730$

$= 17190$

$= 1.7 \times 10^4Y$

$T_{1/2} = 6h$ 18.4

$T_p = 36h$

$T_p = nT_{1/2}$

$36 = n \times 6$

$n = 36/6 = 6$

اصل مقدار $= N_0$

باقی مقدار $= N$

$N = N_0/2^n$

$= 200/2^6$

$= 200/64$

$= 3.12mg$

$T_{1/2} = 10mint$ 18.5

اصل مقدار $= N_0$

$= 368c/m$

باقی مقدار $= N = 23c/m$

$N = N_0/2^n$

$23 = 368/2^n$

$2^n = 368/23$

$2^n = 16$

$2^n = 2^4$

$n = 4$

$T_p = nT_{1/2}$

$= 4 \times 10$

$= 40mint$

دو ہاف لائف کے بعد

$T_p = 4mint$ 18.6

$T_p = nT_{1/2}$

$4 = 2 \times T_{1/2}$

$T_{1/2} = 4/2 = 2mint$

$T_{1/2} = 1500Y$ 18.7

اصل مقدار $= N_0$

$= 32000c/m$

باقی مقدار $= N = N_0/16$

$N = N_0/2^n$

$N_0/16 = N_0/2^n$

$16 = 2^n$

$2^4 = 2^n$

$n = 4$

$T_p = nT_{1/2}$

$= 4 \times 1500$

$= 6000Y$

$T_{1/2} = 4000Y$ 18.8

$t = 8h$

C.R =310,300,280, 270,312,305,290

کاونٹ ریٹ میں بے ترتیبی ظاہر کرتی ہے کہ اس کی ہاف لائف چار ہزار بہت زیادہ ہے اور مشاہدہ کا ٹائم آٹھ گھنٹے بہت کم ہے

اصل مقدار $= N_0$ 18.9

باقی مقدار $= N = N_0/8$

$T_{1/2} = 5730Y$

$N = N_0/2^n$

$N_0/8 = N_0/2^n$

$1/8 = 1/2^n$

$8 = 2^n$

$n = 3$

$T_p = nT_{1/2}$

$= 3 \times 5730$

$= 17190Y$

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