

DARLING PHYSICS

Numericals

CLASS: 9th/10th

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SST (SCIENCE)

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NUMERICAL:9

CHAPTER # 01

Exp: 1, 2, 4

(a) $5000g = 5 \times 10^3g = 5kg$ **1.1**

(b) $2000000W = 2 \times 10^6W = 2MW$

(c) $52 \times 10^{-10}kg = 52 \times 10^{-10} \times 10^3g = 52 \times 10^{-7}g = 5.2 \times 10^{-6}g = 5.2\mu g$

(d) $225 \times 10^{-10}s = 2.25 \times 10^{-6}s = 2.25\mu s$ **1.2**

$1p = 10^{-12}$ / $1n = 10^{-9}$
 $1u = 10^{-6}$ / $1u = 10^3n$
 $1n = 10^3$ / $1u = 10^6p$

بال بڑھنے کی شرح **1.3**

$V = d/t$
 $= 1mm/1 \text{ day}$
 $= 1 \times 10^{-3}/86400$
 $= 1.157 \times 10^{-5} \times 10^{-3}$
 $= 1.157 \times 10^{-8}$
 $= 11.57 \times 10^{-9}$
 $= 11.57nm/s$

(a) 1168×10^{-27} **1.4**
 $= 1.168 \times 10^{-27+3}$
 $= 1.168 \times 10^{-24}$

(b) $32 \times 10^5 = 3.2 \times 10^5 = 3.2 \times 10^6$

(c) $725 \times 10^{-5}kg = 725 \times 10^{-5} \times 10^3g = 725 \times 10^{-2}g = 7.25g$

(d) $0.02 \times 10^{-8} = 2 \times 10^{-8-2} = 2 \times 10^{-10}$

(a) $6400km = 6.4 \times 10^3km$ **1.5**

(b) $380000km = 3.8 \times 10^5km$

(c) $3000000000m/s = 3 \times 10^9m/s$

(d) ایک دن میں سیکنڈ = $24 \times 60 \times 60s = 86400s = 8.64 \times 10^4s$

زیر واپس = 0.01×4 **1.6**

$= 0.04cm$
 زیر و کوریکشن $= -0.04cm$

درجوں کی تعداد = 50 **1.7**

سکریو کی پیچ $= 0.5mm$

L.C = درجے/پیچ
 $= 0.5/50$
 $= 0.01cm$

$0.00309kg = 3$ **1.8**

$5.05 \times 10^{-27} = 3$

$1.009m = 4$ **1.9**

$0.00450kg = 3$

$1.66 \times 10^{-27}kg = 3$

$2001s = 4$

لبائی = $6.7cm$ **1.10**

چوڑائی = $5.4cm$

رقبہ = $L \times W = 6.7 \times 5.4 = 36.78cm^2 = 36cm^2$

CHAPTER # 02

Exp: 2, 3, 4, 5, 10, 11

$V = 36km/h$ **2.1**

$= 36 \times 1000m/3600$

$V = 10m/s$

$t = 10s$

$S = Vxt$

$= 10 \times 10$

$= 100m$

$V_i = 0$ **2.2**

$S = 1000m$

$t = 100s$

$V_f = ?$

$S = V_i t + \frac{1}{2}at^2$

$10^3 = 0 \times 100 + \frac{1}{2}a \times (100)^2$

$a = 0.2m/s^2$

$V_f = V_i + at$

$= 0 + 0.2 \times 100$

$= 20m/s$

$V_i = 10m/s$ **2.3**

$a = 0.2m/s^2$

$t = 30s$

$S = ?$

$V_f = ?$

$V_f = V_i + at$

$= 10 + 0.2 \times 30$

$= 10 + 6 = 16m/s$

$S = V_i t + \frac{1}{2}at^2$

$= 10 \times 30 + \frac{1}{2} \times 0.2 \times (30)^2$

$= 300 + \frac{1}{2} \times 0.2 \times 900$

$= 300 + 90$

$= 390m$

$V_i = 30m/s$ **2.4**

$V_f = 0$

$g = -10m/s^2$

$h = ?$

$2gh = V_f^2 - V_i^2$

$2(-10)h = (0)^2 - (30)^2$

$-20h = -900$

$h = -900/-20$

$h = 45m$

واپسی کا نام $= t = 3s$

پانچ سیکنڈ میں طے فاصلہ **2.5**

$V_i = 40m/s$

$t = 5s$

$S_1 = Vxt$

$S_1 = 40 \times 5$

$= 200m$

دس سیکنڈ میں طے فاصلہ

$V_i = 40m/s$

$V_f = 0$

$t = 10s$

$V_{av} = V_f + V_i/2$

$= 0 + 40/2$

$= 20m/s$

$S_2 = Vxt$

$S_2 = 20 \times 10$

$= 200m$

کل فاصلہ $= S_1 + S_2$

$= 200 + 200$

$= 400m$

ڈسپلین

$a_{av} = V_f - V_i/t$

$= 0 - 40/10 = -40/10$

$= -4m/s^2$

$V_i = 0$ **2.6**

$a = 0.5m/s^2$

$S = 100m$

$V_f = ?$

$2aS = V_f^2 - V_i^2$

$2(0.5)100 = V_f^2 - (0)^2$

$V_f^2 = 100$

$V_f = 10m/s^2$

$V_f = 10 \times 3600/1000$

$V_f = 36km/h$

دو منٹ میں طے فاصلہ **2.7**

$V_i = 0$

$V_f = 48km/h$

$= 13.33m/s$

$t = 2mint = 2 \times 60$

$= 120s$

$V_{av} = V_f - V_i/2$

$= 0 + 13.33/2$

$= 6.66m/s$

$S_1 = V_{av}xt$

$= 6.66 \times 120$

$= 800m$

پانچ منٹ میں طے فاصلہ

$V = 13.33m/s$

$t = 5mint = 5 \times 60$

$= 300s$

$S_2 = Vxt$

$= 13.66 \times 300$

$= 4000m$

تین منٹ میں طے فاصلہ

$V_i = 13.66m/s$

$V_f = 0$

$t = 3mint = 3 \times 60$

$= 180s$

$V_{av} = V_f + V_i/2$

$= 0 + 13.66/2$

$= 6.66m/s$

$S_3 = V_{av}xt$

$= 6.66 \times 180$

$= 1200m$

کل فاصلہ $= S_1 + S_2 + S_3$

$= 800 + 4000 + 1200$

$= 6000m$

اوپر جانے کا وقت **2.8**

$t = 6/2 = 3s$

$g = -10m/s^2$

$V_f = 0$

$h = ?$

$V_i = ?$

$V_f = V_i + gt$

$0 = V_i + (-10) \times 3$

$V_i = 30m/s$

$2gh = V_f^2 - V_i^2$

$2(-10)h = (0)^2 - (30)^2$ $20xh = -900$

$h = -900/-20$

$= 45m$

$S = 800m$ **2.9**

$V_i = 96km/h$

$= 26.67m/s$

$V_f = 48km/h$

$= 13.33m/s$

$a = ?$

$2aS = V_f^2 - V_i^2$

$2a800 = (13.33)^2 - (26.67)^2$

$1600a = 177.68 - 711.28$

$a = -533.6/1600$

$= -0.3335m/s^2$

اس ایکسپریشن سے طے فاصلہ

$V_i = 13.33m/s$

$V_f = 0$

$a = -0.3335m/s^2$

$S = ?$

$2aS = V_f^2 - V_i^2$

$2(-0.3335)S = (0)^2 - (13.33)^2$

$0.667 \times S = -177.66$

$$S = -177.66/-0.667$$

$$S = 266.4m$$

$$V_i = 26.67m/s \quad [2.10]$$

$$V_f = 0$$

$$a = -0.3335m/s^2$$

$$V_f = V_i + at$$

$$t = 0-26.67/-0.3335$$

$$t = 80s$$

CHAPTER # 03

Exp: 1, 2, 3, 6, 7, 8

$$F = 20N \quad [3.1]$$

$$a = 2m/s^2$$

$$F = ma$$

$$m = F/a$$

$$= 20/2$$

$$= 10kg$$

$$W = 147N \quad [3.2]$$

$$g = 10m/s^2$$

$$W = mg$$

$$m = W/g$$

$$= 147/10$$

$$= 14.7kg$$

$$m = 10kg \quad [3.3]$$

$$g = 10m/s^2$$

$$W = mg \rightarrow F$$

$$= 10 \times 10$$

$$= 100N$$

$$F = 100N \quad [3.4]$$

$$m = 50kg$$

$$F = ma$$

$$a = F/m$$

$$= 100/50$$

$$= 2m/s^2$$

$$W = 20N \quad [3.5]$$

$$a = 2m/s^2$$

$$g = 10m/s^2$$

$$W = mg$$

$$m = W/g$$

$$= 20/10$$

$$= 2kg$$

$$F = ma$$

$$= 2 \times 2 = 4N$$

$$ساری فورس = W + F$$

$$F = 20 + 4$$

$$= 24N$$

$$مٺاس m_1 = 52kg \quad [3.6]$$

$$چوٺاس m_2 = 48kg$$

$$g = 10m/s^2$$

$$a = \frac{(m_1 - m_2)g}{m_1 + m_2}$$

$$= (52 - 48) \times 10 / 52 + 48$$

$$= 4 \times 10 / 100 = 40 / 100$$

$$a = 0.4m/s^2$$

$$T = \frac{2m_1m_2g}{m_1 + m_2}$$

$$= 2 \times 52 \times 48 \times 10 / 100$$

$$= 49920 / 100$$

$$T = 500N$$

$$مٺاس m_1 = 24k \quad [3.7]$$

$$چوٺاس m_2 = 26kg$$

$$g = 10m/s^2$$

$$a = \frac{m_1g}{m_1 + m_2}$$

$$= 24 \times 10 / 24 + 26$$

$$a = 240 / 50$$

$$= 4.8m/s^2$$

$$T = \frac{m_1m_2g}{m_1 + m_2}$$

$$= 24 \times 26 \times 10 / 24 + 26$$

$$T = 6240 / 50$$

$$= 125N$$

$$\Delta P = 22Ns \quad [3.8]$$

$$F = 20N$$

$$F = \Delta P / t$$

$$t = \Delta P / F$$

$$= 22 / 20$$

$$t = 1.1s$$

$$m = 5kg \quad [3.9]$$

$$\mu = 0.6$$

$$F_s = \mu F = \mu mg$$

$$F_s = 0.6 \times 5 \times 10$$

$$= 30N$$

$$m = 0.5kg \quad [3.10]$$

$$r = 50cm$$

$$r = 50 / 100$$

$$= 0.5m$$

$$V = 3m/s$$

$$F_c = mV^2/r$$

$$= 0.5 \times (3)^2 / 0.5$$

$$= 9N$$

CHAPTER # 04

Exp: 1, 2, 5

$$F_x = 10 - 4 = 6N \quad [4.1]$$

$$F_y = 6N$$

$$F = \sqrt{F_x^2 + F_y^2}$$

$$F = \sqrt{6^2 + 6^2}$$

$$F = \sqrt{72} = 8.5N$$

$$\theta = \tan^{-1}(F_y/F_x)$$

$$\theta = \tan^{-1}(6/6)$$

$$\theta = \tan^{-1}(1)$$

$$= 45^\circ$$

$$F = 50N \quad [4.2]$$

$$\theta = 30^\circ$$

$$F_x = F \cos \theta$$

$$= 50 \cos 30^\circ$$

$$= 50 \times 0.866$$

$$= 43.3N$$

$$F_y = F \sin \theta$$

$$= 50 \sin 30^\circ$$

$$= 50 \times 0.5$$

$$= 25N$$

$$F_x = 12N \quad [4.3]$$

$$F_y = 5N$$

$$F = \sqrt{F_x^2 + F_y^2}$$

$$F = \sqrt{12^2 + 5^2}$$

$$F = \sqrt{169} = 13N$$

$$\theta = \tan^{-1}(F_y/F_x)$$

$$\theta = \tan^{-1}(5/12)$$

$$= 22.6^\circ$$

$$F = 100N \quad [4.4]$$

$$r = 10cm = 0.1m$$

$$\tau = rF$$

$$= 0.1 \times 100$$

$$= 10Nm$$

$$F_x = 20N \quad [4.5]$$

$$\theta = 30^\circ$$

$$F_x = F \cos \theta$$

$$F = F_x / \cos \theta$$

$$= 20 / \cos 30^\circ$$

$$= 20 / 0.866$$

$$= 23.1N$$

$$F = 50N \quad [4.6]$$

$$r = 16cm = 0.16m$$

ڪيل ڪنارڪ

$$\tau = 2rF$$

$$= 2 \times 0.16 \times 50$$

$$= 16Nm$$

$$T_1 = 3.8N \quad [4.7]$$

$$T_2 = 4.4N$$

$$W = T_1 + T_2$$

$$= 3.8 + 4.4$$

$$= 8.2N$$

$$m_1 = 3kg \quad [4.8]$$

$$m_2 = 5kg$$

$$T_1 = mg$$

$$= 3 \times 10$$

$$= 30N$$

$$T_2 = (m_1 + m_2)g$$

$$= (3 + 5) \times 10$$

$$= 80N$$

$$F_1 = 200N \quad [4.9]$$

$$r_1 = 20cm = 0.2m$$

$$F_2 = 150N$$

$$r_2 = ?$$

$$\tau_1 = \tau_2$$

$$F_1r_1 = F_2r_2$$

$$r_2 = F_1r_1/F_2$$

$$= 0.1 \times 200 / 150$$

$$= 0.133m$$

$$= 13.3cm$$

$$m = 10kg \quad [4.10]$$

$$F_1 = mg$$

$$F_1 = 10 \times 10 = 100N$$

$$r_1 = 20cm = 0.2m$$

$$r_2 = 50cm = 0.5m$$

$$F_2 = ?$$

اٺي ڪلاڪ وائز = ڪلاڪ وائز ٺارڪ

$$F_2r_2 = F_1r_1$$

$$F_2 = F_1r_1/r_2$$

$$= 100 \times 0.2 / 0.5$$

$$= 20 / 0.5$$

$$= 40N$$

CHAPTER # 05

Exp: 1, 2

$$m_1 = 1000kg \quad [5.1]$$

$$m_2 = 1000kg$$

$$d = 0.5m$$

$$G = 6.67 \times 10^{-11} Nm^2kg^{-2}$$

$$F = Gm_1m_2/d^2$$

$$= G \times 10^3 \times 10^3 / (0.5)^2$$

$$= 6.67 \times 10^{-11} \times 10^6 / 0.25$$

$$= 26.7 \times 10^{-11+6}$$

$$= 26.7 \times 10^{-5}$$

$$= 2.67 \times 10^{-4} N$$

$$m = m_1 = m_2 = ? \quad [5.2]$$

$$F = 0.006673N$$

$$d = 1m$$

$$G = 6.67 \times 10^{-11} Nm^2kg^{-2}$$

$$F = Gm_1m_2/d^2$$

$$m^2 = Fd^2/G$$

$$= \frac{0.006673(1)^2}{6.673 \times 10^{-11}}$$

$$= \frac{6.673 \times 10^{-3}}{6.673 \times 10^{-11}}$$

$$m^2 = 1 \times 10^{-3+11}$$

$$= 10^8$$

$$\sqrt{m^2} = \sqrt{(10^8)^2}$$

$$m = 10000kg$$

$$M_m = 6.42 \times 10^{23}kg$$

$$R_m = 3370km \quad [5.3]$$

$$= 3.370 \times 10^6m$$

$$G = 6.67 \times 10^{-11} Nm^2kg^{-2}$$

$$g_m = GM_m/R^2$$

$$= \frac{6.673 \times 10^{-11} \times 6.42 \times 10^{23}}{(3.370 \times 10^6)^2}$$

$$= \frac{42.84 \times 10^{23-11}}{11.35 \times 10^{12}}$$

$$= 3.77 \times 10^{12-12}$$

$$= 3.77 \times 10^0$$

$$g_m = 3.77m/s^2$$

$$g_m = 1.62m/s^2 \quad [5.4]$$

$$R_m = 1740km$$

$$= 1.740 \times 10^6 \text{m}$$

$$G = 6.67 \times 10^{-11} \text{Nm}^2 \text{kg}^{-2}$$

$$M_m = g_m R^2 / G$$

$$= \frac{1.62 \times (1.74 \times 10^6)^2}{6.673 \times 10^{-11}}$$

$$= \frac{1.62 \times 3.027 \times 10^{12}}{6.673 \times 10^{-11}}$$

$$= \frac{4.904712 \times 10^{12+11}}{6.673}$$

$$= 0.735 \times 10^{23}$$

$$M_m = 7.35 \times 10^{22} \text{kg}$$

$$h = 3600 \text{km} \quad [5.5]$$

$$= 3.6 \times 10^6 \text{m}$$

$$R = 6.4 \times 10^6 \text{m}$$

$$M_e = 6 \times 10^{24} \text{kg}$$

$$g_m = GM / (R+h)^2$$

$$= \frac{6.67 \times 10^{-11} \times 6 \times 10^{24}}{(6.4 \times 10^6 + 3.6 \times 10^6)^2}$$

$$= \frac{40.038 \times 10^{24-11}}{[(6.4+3.6) \times 10^6]^2}$$

$$= \frac{40.038 \times 10^{13}}{(10 \times 10^6)^2}$$

$$= \frac{40.038 \times 10^{13}}{100 \times 10^{12}}$$

$$= 0.4 \times 10^{13-12}$$

$$= 0.4 \times 10^1$$

$$g_m = 4 \text{m/s}^2$$

$$R = 48700 \text{km} \quad [5.6]$$

$$= 48.7 \times 10^6 \text{m}$$

$$g = GM / R^2$$

$$= \frac{6.67 \times 10^{-11} \times 6 \times 10^{24}}{(48.7 \times 10^6)^2}$$

$$= \frac{40.038 \times 10^{24-11}}{2371.69 \times 10^{12}}$$

$$= 0.017 \times 10^{13-11}$$

$$= 0.017 \times 10^1$$

$$g = 0.17 \text{m/s}^2$$

$$R = 10000 \text{km} \quad [5.7]$$

$$= 10^7 \text{m}$$

$$g = 4 \text{m/s}^2$$

$$M_e = g R^2 / G$$

$$= \frac{4 \times (10^7)^2}{6.67 \times 10^{-11}}$$

$$= 0.599 \times 10^{14+11}$$

$$= 0.599 \times 10^{25}$$

$$M = 5.99 \times 10^{24} \text{kg}$$

$$g_h = \frac{1}{4} g \quad [5.8]$$

$$g_h = GM / (R+h)^2$$

$$(R+h)^2 = GM / g_h$$

$$= GM / \frac{1}{4} g$$

$$(R+h)^2 = 4GM / g$$

دونوں طرف جذری

$$\sqrt{(R+h)^2} = \sqrt{4GM / g}$$

$$R+h = \sqrt{4R^2}$$

$$R+h = 2R$$

$$h = 2R - R$$

$$h = R$$

$$h = 850 \text{km} \quad [5.9]$$

$$h = 0.85 \times 10^6 \text{m}$$

$$V_0 = (GM / (R+h))^{1/2}$$

$$= \frac{(6.673 \times 10^{-11} \times 6 \times 10^{24})^{1/2}}{(0.85 \times 10^6 + 6.4 \times 10^6)^{1/2}}$$

$$= \frac{(40.038 \times 10^{13})^{1/2}}{[(0.85+6.4) \times 10^6]^{1/2}}$$

$$= \frac{(40.038 \times 10^{13-6})^{1/2}}{(7.25)^{1/2}}$$

$$= (5.522 \times 10^7)^{1/2}$$

$$= (55.22 \times 10^6)^{1/2}$$

$$= 7.431 \times 10^3$$

$$V_0 = 7431 \text{m/s}$$

$$h = 42000 \text{km} \quad [5.10]$$

$$= 42 \times 10^6 \text{m}$$

$$V_0 = (GM / (R+h))^{1/2}$$

$$= \frac{(6.673 \times 10^{-11} \times 6 \times 10^{24})^{1/2}}{(42 \times 10^6 + 6.4 \times 10^6)^{1/2}}$$

$$= \frac{(40.038 \times 10^{24-11})^{1/2}}{[(42+6.4) \times 10^6]^{1/2}}$$

$$= \frac{(40.038 \times 10^{13-6})^{1/2}}{(48.4)^{1/2}}$$

$$= (0.8272 \times 10^7)^{1/2}$$

$$= (8.272 \times 10^6)^{1/2}$$

$$= 2.876 \times 10^3$$

$$V_0 = 2876 \text{m/s}$$

CHAPTER # 06

Exp: 1, 2, 3, 4, 5

$$F = 300 \text{N} \quad [6.1]$$

$$d = 35 \text{m}$$

$$W = Fd$$

$$= 300 \times 35$$

$$= 10500 \text{J}$$

$$W = mg = 20 \text{N} \quad [6.2]$$

$$h = 6 \text{m}$$

$$P.E = mgh$$

$$= 20 \times 6$$

$$= 120 \text{J}$$

$$W = 12 \text{kN} \quad [6.3]$$

$$= 12000 \text{N}$$

$$V = 20 \text{m/s}$$

$$W = mg$$

$$m = W / g$$

$$= 12000 / 10$$

$$= 1200 \text{kg}$$

$$K.E = \frac{1}{2} m V^2$$

$$= \frac{1}{2} \times 1200 \times (20)^2$$

$$= 600 \times 400$$

$$= 240000$$

$$= 240 \times 10^3$$

$$= 240 \text{kJ}$$

$$m = 500 \text{g} \quad [6.4]$$

$$= 0.5 \text{kg}$$

$$V = 15 \text{m/s}$$

$$K.E = \frac{1}{2} m V^2$$

$$= \frac{1}{2} \times 500 \times (0.5)^2$$

$$= 0.5 \times 225 / 2$$

$$K.E = 56.25 \text{J}$$

کنزرویشن آف انرجی کے قانون کے مطابق

$$K.E = P.E$$

$$P.E = 56.25 \text{J}$$

$$h = 6 \text{m} \quad [6.5]$$

$$V = 1.5 \text{m/s}$$

$$m = 40 \text{kg}$$

$$P.E = mgh$$

$$= 40 \times 10 \times 6$$

$$= 2400 \text{J}$$

$$K.E = \frac{1}{2} m V^2$$

$$= \frac{1}{2} \times 40 \times (1.5)^2$$

$$= 20 \times 2.25$$

$$= 45 \text{J}$$

$$V = 4 \text{m/s} \quad [6.6]$$

$$F = 4000 \text{N}$$

$$P = W / t = F.d / t$$

$$P = F.V$$

$$= 4000 \times 4$$

$$= 16000 \text{W}$$

$$= 16 \text{kW}$$

$$F = 300 \text{N} \quad [6.7]$$

$$d = 50 \text{m}$$

$$t = 60 \text{s}$$

$$P = W / t = F.d / t$$

$$P = 300 \times 50 / 60$$

$$= 250 \text{W}$$

$$m = 50 \text{kg} \quad [6.8]$$

$$t = 20 \text{s}$$

$$\text{سیڑھی کی لمبائی} = 16 \text{cm}$$

$$= 16 / 100 = 0.16 \text{m}$$

$$h = 25 \times 0.16 = 4 \text{m}$$

$$P = W / t = mgh / t$$

$$= 50 \times 10 \times 4 / 20$$

$$= 100 \text{W}$$

$$m = 200 \text{kg} \quad [6.9]$$

$$h = 6 \text{m}$$

$$t = 10 \text{s}$$

$$P = W / t = mgh / t$$

$$= 200 \times 10 \times 6 / 10$$

$$= 1200 \text{W}$$

$$m = 800 \text{kg} \quad [6.10]$$

$$P = 1 \text{hp} = 746 \text{W}$$

$$t = 10 \text{mint} = 600 \text{s}$$

$$h = 15 \text{m}$$

$$P = W / t$$

$$W = P \times t$$

$$= 746 \times 600$$

$$\text{input} = 447600 \text{J}$$

$$W = mgh$$

$$= 800 \times 10 \times 15$$

$$\text{output} = 120000 \text{J}$$

$$E_f = (\text{output} / \text{input}) \times 100$$

$$= \frac{120000}{447600} \times 100$$

$$E_f = 26.8\%$$

CHAPTER # 07

Exp: 1, 2

$$m = 850 \text{g} \quad [7.1]$$

$$= 850 / 1000 = 0.85 \text{kg}$$

$$V = 40 \text{cm} \times 10 \text{cm} \times 5 \text{cm}$$

$$= \frac{40 \text{m}}{100} \times \frac{10 \text{m}}{100} \times \frac{5 \text{m}}{100}$$

$$= 0.4 \text{m} \times 0.1 \text{m} \times 0.05 \text{m}$$

$$V = 0.002 \text{m}^3$$

$$\rho = m / V$$

$$= 0.85 / 0.002$$

$$= 425 \text{kg/m}^3$$

$$m = 1 \text{L} = 1 \text{kg} \quad [7.2]$$

$$\rho = 0.92 \text{kg/L}$$

$$V = m / \rho$$

$$= 1 / 0.92 = 1.09 \text{L}$$

(a) $m = 5 \text{kg} \quad [7.3]$

$$\rho = 8200 \text{kg/m}^3$$

$$V = m / \rho = 5 / 8200$$

$$= 6.01 \times 10^{-4} \text{m}^3$$

(b) $m = 200 \text{g}$

$$= 200 / 1000 = 0.2 \text{kg}$$

$$\rho = 11300 \text{kg/m}^3$$

$$V = m / \rho = 0.2 / 11300$$

$$= 1.77 \times 10^{-5} \text{m}^3$$

(c) $m = 0.2 \text{kg}$

$$\rho = 19300 \text{kg/m}^3$$

$$V = m / \rho = 0.2 / 19300$$

$$= 1.04 \times 10^{-5} \text{m}^3$$

$$\rho = 1.3 \text{kg/m}^3 \quad [7.4]$$

$$V = 8 \text{m} \times 5 \text{m} \times 4 \text{m}$$

$$= 160 \text{m}^3$$

$$m = \rho \times V$$

$$= 160 \times 1.3$$

$$= 208 \text{kg}$$

$$F = 75 \text{N} \quad [7.5]$$

$$A = 1.5 \text{cm}^2$$

$$(1 \text{m})^2 = (100 \text{cm})^2$$

$$1 / 10^4 \text{m}^2 = 1 \text{cm}^2$$

$$1.5 \text{cm}^2 = 0.00015 \text{m}^2$$

$$P = F / A$$

$$= 75 / 0.00015$$

$$= 5 \times 10^5 \text{Pa}$$

$$L = 10 \text{mm} \quad [7.6]$$

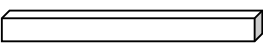
$$= 10 / 1000 = 0.01 \text{m}$$

$$A = L \times L = 0.01 \times 0.01$$

$$= 1 \times 10^{-4} \text{m}^2$$

$F = 20\text{N}$
 $P = F/A = 20/10^{-4}$
 $= 2 \times 10^5 \text{N/m}^2$

 $m = 1000\text{g} = 1\text{kg}$ [7.7]
 $A = 7.5\text{cm} \times 7.5\text{cm}$
 $= \frac{7.5\text{m}}{100} \times \frac{7.5\text{m}}{100}$
 $= 0.075\text{m} \times 0.075\text{m}$
 $A = 0.005625\text{m}^2$
 $F = mg$
 $= 1 \times 10 = 10\text{N}$
 $P = F/A$
 $= 10/0.005625$
 $= 1778\text{N/m}^2$


 $V = \frac{20\text{cm}}{100} \times \frac{7.5\text{cm}}{100} \times \frac{7.5\text{cm}}{100}$
 $= 0.2\text{m} \times 0.075\text{m} \times 0.075\text{m}$
 $V = 0.001125\text{m}^3$
 $\rho = m/V$
 $= 1/0.001125$
 $= 888.89\text{kg/m}^3$

کیوب کے ماس اور ڈینسٹی کے لحاظ سے

اس کا اصل والیوم [7.8]

 $m = 306\text{g}$
 $\rho = 2.55\text{g/cm}^3$
 $V_0 = m/\rho$
 $= 306/2.55$
 $= 120\text{cm}^3$

کیوب کی شکل کی وجہ سے اس کا والیوم

 $V_s = 5 \times 5 \times 5 = 125\text{cm}^3$
 $V_c = V_s - V_0$
 $V_c = 125 - 120 = 5\text{cm}^3$

 $W_{\text{air}} = 18\text{N}$ [7.9]
 $W_{\text{water}} = 11.4\text{N}$
 $D = (W_{\text{air}}/W_{\text{air}} - W_{\text{wat}})\rho$
 $D = (18/6.6) \times 1000$
 $= 2727\text{kg/m}^3$ (AI)

 $W = 3.06\text{N}$ [7.10]
 $m = W/g = 3.06/10$
 $= 0.306\text{kg} = 306\text{g}$
 $\rho = 0.6\text{g/cm}^3$

(a) $V = m/\rho$
 $= 306/0.6 = 510\text{cm}^3$

(b) $V = m/\rho$
 $= 306/0.9 = 340\text{cm}^3$

 $F_2 = 20000\text{N}$ [7.11]

پریس کے پمپ کا ایریا

 $D = 30\text{cm}$
 $R = D/2 = 30/2$
 $= 15\text{cm} = 0.15\text{m}$
 $A = \pi R^2$
 $= 3.14 \times (0.15)^2$
 $= 0.07065\text{m}^2$

پمپ کے پمپ کا ایریا

 $d = 3\text{cm}$
 $r = d/2 = 3/2$
 $= 1.5\text{cm} = 0.015\text{m}$
 $a = \pi r^2$
 $= 3.14 \times (0.015)^2$
 $= 0.0007065\text{m}^2$
 $F_2/A = F_1/a$
 $F_1 = F_2 \times a/A$
 $= 20000 \times 0.0007065$
 0.07065
 $F_1 = 14.13/0.07065$
 $F_1 = 200\text{N}$

 $A = 2 \times 10^{-5}\text{m}^2$ [7.12]
 $F = 4000\text{N}$

اصل لمبائی = $L = 2\text{m}$

 $\Delta L = 2\text{mm}$
 $= 2/1000 = 0.002\text{m}$
 $Y = FxL/Ax\Delta L$
 $= 4000 \times 2 / (2 \times 10^{-5} \times 0.002)$
 $= 8000 / 4 \times 10^{-8}$
 $Y = 2 \times 10^{11}\text{N/m}^2$

CHAPTER # 08

Exp: 1, 2, 3, 4

 $C = 50^\circ\text{C}$ [8.1]
 $F = 1.8^\circ\text{C} + 32$
 $= 1.8 \times 50 + 32$
 $F = 122^\circ\text{F}$

 $F = 98.6^\circ\text{F}$ [8.2]
 $C = (F - 32)/1.8$
 $= (98.6 - 32)/1.8$
 $= 37^\circ\text{C}$
 $K = C + 273$
 $= 37 + 273$
 $= 310\text{K}$

 $L_0 = 2\text{m}$ [8.3]
 $T_1 = 0^\circ\text{C} = 273\text{K}$
 $T_2 = 20^\circ\text{C} = 293\text{K}$
 $\alpha = 2.5 \times 10^{-5}\text{K}^{-1}$
 $\Delta L = \alpha L_0 (T_2 - T_1)$
 $= 2.5 \times 10^{-5} \times 2 \times (293 - 273)$
 $= 2.5 \times 10^{-5} \times 2 \times (20)$
 $= 2.5 \times 40 \times 10^{-5}$
 $= 100/10^5$
 $= 0.001\text{m} = 0.1\text{cm}$

 $V_0 = 1.2\text{m}^3$ [8.4]
 $T_1 = 15^\circ\text{C} = 288\text{K}$
 $T_2 = 40^\circ\text{C} = 313\text{K}$
 $\beta = 3.67 \times 10^{-3}\text{K}^{-1}$
 $V = V_0(1 + \beta \Delta T)$
 $= 1.2[1 + 3.67 \times 10^{-3}(313 - 288)]$
 $= 1.2[1 + 3.67 \times 10^{-3}(25)]$
 $= 1.2[1 + 0.09175]$
 $V = 1.3\text{m}^3$

$m = 0.5\text{kg}$ [8.5]
 $T_1 = 10^\circ\text{C} = 283\text{K}$
 $T_2 = 65^\circ\text{C} = 338\text{K}$
 $C = 4200\text{J/kgK}$
 $\Delta Q = Cm\Delta T$
 $= 0.5 \times 4200(338 - 283)$
 $= 0.5 \times 4200 \times 55$
 $\Delta Q = 115500\text{J}$

 $\Delta Q = 1000\text{J/s}$ [8.6]
 $m = 200\text{g} = 0.2\text{kg}$
 $T_1 = 20^\circ\text{C} = 293\text{K}$
 $T_2 = 90^\circ\text{C} = 363\text{K}$
 $Q = Cm\Delta T/t$
 $t = 4200 \times 0.2(363 - 293)/Q$
 $t = 840(70)/1000$
 $t = 58800/1000$
 $t = 58.8\text{s}$

 $\Delta Q = 50000\text{J}$ [8.7]
 $H_f = 336000\text{K/kg}$
 $\Delta Q = H_f m$
 $m = \Delta Q/H_f$
 $m = 50000/336000$
 $= 0.149\text{kg}$
 $= 150\text{g}$

 $m = 100\text{g} = 0.1\text{kg}$ [8.8]

برف کو گرم کرنے کے لیے درکار حرارت

 $Q_1 = Cm\Delta T (-10 \rightarrow 0)$
 $= 2100 \times 0.1[0 - (-10)]$
 $Q_1 = 2100\text{J}$

برف کو پگھلانے کے لیے درکار حرارت

 $Q_2 = mH_f$ (@ 0°C)
 $= 0.1 \times 336000$
 $Q_2 = 33600\text{J}$

پانی کو گرم کرنے کے لیے درکار حرارت

 $Q_3 = Cm\Delta T (0 \rightarrow 10)$
 $= 4200 \times 0.1(10 - 0)$
 $Q_3 = 4200\text{J}$

کل حرارت = $Q_1 + Q_2 + Q_3$
 $= 2100 + 33600 + 4200$
 $Q = 39900\text{J}$

 $T = 100^\circ\text{C}$ [8.9]
 $m = 100\text{g} = 0.1\text{kg}$
 $H_v = 2.26 \times 10^6\text{J/kg}$
 $\Delta Q = mH_v$
 $= 0.1 \times 2.26 \times 10^6$
 $= 2.26 \times 10^5\text{J}$

 $m_{\text{steam}} = 5\text{g}$ [8.10]
 $= 5/1000 = 0.005\text{kg}$
 $m_{\text{water}} = 500\text{g}$
 $= 500/1000 = 0.5\text{kg}$

پانی کی پہلے ٹھہر پھر سے آخری ٹھہر پھر تک

اسپن ماس کے لحاظ سے جذب کردہ حرارت

$Q_p = Cm\Delta T$
 $= Cm(T_2 - T_1)$
 $= 2100 \times 0.5(T_2 - 10)$
 $= 2100T_2 - 21000$

ماس کے لحاظ سے بھاپ کی خارج کردہ حرارت

 $Q = mH_v$
 $= 0.005 \times 2.26 \times 10^6$
 $= 11300\text{J}$

بھاپ کی پہلے ٹھہر پھر سے آخری ٹھہر پھر تک جاتے ہوئے خارج کردہ حرارت

 $Q = Cm\Delta T$
 $= 4200 \times 0.005(100 - T_2)$
 $= Q = 2100 - 21T_2$

= پانی کی جذب کردہ حرارت

بھاپ کی خارج کردہ حرارت

 $2100T_2 - 2100 =$
 $11300 + 2100 - 21T_2$
 $2100T_2 + 21T_2 =$
 $11300 + 2100 + 21000$
 $2121T_2 = 34400$
 $T_2 = 34400/2121$
 $T_2 = 16.21^\circ\text{C}$

CHAPTER # 09

[9.1]

 $A = 200\text{m}^2$
 $L = 20\text{cm} = 0.2\text{m}$
 $T_1 = 15^\circ\text{C} = 288\text{K}$
 $T_2 = 35^\circ\text{C} = 308\text{K}$
 $k = 0.65\text{W/mK}$
 $Q/t = kA(T_2 - T_1)/L$
 $= 0.65 \times 200(308 - 288)$
 0.2
 $= 130 \times (20)/0.2$
 $= 13000\text{J/s}$

 $A = 2 \times 2.5 = 5\text{m}^2$ [9.2]
 $L = 0.8\text{cm} = 0.008\text{m}$
 $t = 1\text{hr} = 3600\text{s}$
 $T_1 = 5^\circ\text{C} = 278\text{K}$
 $T_2 = 25^\circ\text{C} = 298\text{K}$
 $k = 0.8\text{W/mK}$
 $Q = kA(T_2 - T_1)xt/L$
 $= 0.8 \times 5(298 - 278) \times 3600$
 0.008
 $= 4(20)3600/0.008$
 $= 288000/0.008$
 $= 36000000$
 $Q = 3.6 \times 10^7\text{J}$

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NUMERICAL:10

CHAPTER # 10

Exp: 1, 2, 3

$$T = 2s \quad \boxed{10.1}$$

$$g_e = 10m/s$$

$$g_m = g_e/6$$

$$= 10/6$$

$$= 1.67m/s$$

$$L = ?$$

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

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

$$T^2 = 4\pi^2 x L/g$$

$$L = T^2 x g / 4\pi^2$$

زمین کے لیے لمبائی

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

$$= 10 / 9.8596$$

$$= 1.02m$$

چاند کے لیے لمبائی

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

$$= 1.67 / 9.8596$$

$$= 0.17m$$

$$L = 0.99m \quad \boxed{10.2}$$

$$T = 4.9s$$

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

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

$$T^2 = 4\pi^2 x L/g$$

$$g = 4\pi^2 x L / T^2$$

$$= 4(3.14)^2 \times 0.99 / (4.9)^2$$

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

$$g = 1.63m/s^2$$

$$L = 1m \quad \boxed{10.3}$$

$$g_e = 10m/s$$

$$g_m = 1.67m/s$$

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

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

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

$$= 6.28\sqrt{0.598}$$

$$= 4.9s$$

$$T = 2s \quad \boxed{10.4}$$

$$g = 10m/s^2$$

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

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

$$T^2 = 4\pi^2 x L/g$$

$$L = T^2 x g / 4\pi^2$$

$$= (2)^2 \times 10 / 4 (3.14)^2$$

$$= 4 \times 10 / 4 \times 9.85$$

$$= 40 / 39.4$$

$$L = 1.02m$$

$$t = 20s \quad \boxed{10.5}$$

$$f = \text{وہوز کی تعداد} = n = 100$$

$$\lambda = 6cm$$

$$= 6/100$$

$$= 0.06m$$

$$f = \text{وقت / وہوز کی تعداد}$$

$$= n/t$$

$$= 100/20$$

$$= 5Hz$$

$$T = 1/f$$

$$= 1/5$$

$$= 0.2s$$

$$V = f\lambda$$

$$= 5 \times 0.06 = 0.3m/s$$

$$f = 12Hz \quad \boxed{10.6}$$

$$\lambda = 3cm$$

$$= 3/100$$

$$= 0.03m$$

$$V = f\lambda$$

$$= 12 \times 0.03$$

$$= 0.36m/s$$

$$f = 190Hz \quad \boxed{10.7}$$

$$S = 90m$$

$$t = 0.5s$$

(a) ٹائم پیریڈ

$$T = 1/f$$

$$T = 1/190$$

$$= 0.005s$$

(b) سپیڈ

$$V = S/t$$

$$V = 90/0.5$$

$$= 180m/s$$

(c) وہوز کی لمبائی

$$V = f\lambda$$

$$\lambda = V/f$$

$$\lambda = 180/190$$

$$= 0.95m$$

$$f = 4.8Hz \quad \boxed{10.8}$$

$$\lambda = 6cm$$

$$= 0.06m$$

(a) سپیڈ

$$V = f\lambda$$

$$V = 4.8 \times 0.06$$

$$= 0.29m/s$$

(b) ٹائم پیریڈ

$$T = 1/f$$

$$T = 1/4.8$$

$$= 0.21s$$

$$f = 5Hz \quad \boxed{10.9}$$

$$\lambda = 40mm$$

$$= 40 \times 10^{-3}m$$

$$S = 80cm$$

$$= 80/100$$

$$= 0.8m$$

$$V = f\lambda$$

$$= 5 \times 40 \times 10^{-3}$$

$$= 0.2m/s$$

$$S = Vt$$

$$t = S/V$$

$$= 0.8/0.2$$

$$= 4s$$

$$f = 90MHz \quad \boxed{10.10}$$

$$= 90 \times 10^6 Hz$$

$$V = 3 \times 10^8 m/s$$

$$V = f\lambda$$

$$\lambda = V/f$$

$$= 3 \times 10^8 / 90 \times 10^6$$

$$= 3.33m$$

CHAPTER # 11

Exp: 2, 3

$$I = 3 \times 10^{-6} W/m^2 \quad \boxed{11.1}$$

$$I_0 = 10^{-12} W/m^2$$

(a) ساؤنڈ لیول

$$S.L = 10 \log I / I_0 (dB)$$

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

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

$$= 10 [\log 3 + \log 10^6]$$

$$= 10 [\log 3 + 6 \log 10]$$

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

$$= 64.771$$

$$= 64.8dB$$

(b) انٹینسٹی

$$S.L = 100dB$$

$$S.L = 10 \log I / I_0 (dB)$$

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

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

دونوں طرف انٹی لاگ لیا

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

$$10^{10} \times 10^{-12} = I$$

$$10^{-2} = I$$

$$I = 0.01 W/m^2$$

$$S.L = 80dB \quad \boxed{11.2}$$

$$I_0 = 10^{-12} W/m^2$$

$$S.L = 10 \log I / I_0 (dB)$$

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

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

دونوں طرف انٹی لاگ لیا

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

$$10^8 \times 10^{-12} = I$$

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

$$V = 330m/s \quad \boxed{11.3}$$

$$\lambda = 5cm$$

$$= 5/100$$

$$= 0.05m$$

$$V = f\lambda$$

$$330 = f \times 0.05$$

$$f = 330/0.05$$

$$= 6.6 \times 10^3 Hz$$

ساؤنڈ قابل سماعت ہے

$$f = \text{وہوز کی تعداد} = n = 72 \quad \boxed{11.4}$$

تعداد

$$t = 60s$$

(a) فریکوئنسی

$$f = \text{وقت / وہوز کی تعداد}$$

$$f = n/t$$

$$= 72/60$$

$$= 1.2Hz$$

(b) ٹائم پیریڈ

$$T = 1/f$$

$$= 1/1.2$$

$$= 0.83s$$

$$T = 1.5s \quad \boxed{11.5}$$

$$t = 1.5/2$$

$$= 0.75s$$

$$V = 1500m/s$$

$$S = Vt$$

$$= 1500 \times 0.75$$

$$= 1125m$$

ٹائم صرف ایک طرف کا لیا جائے گا

$$T = 5s \quad \boxed{11.6}$$

$$t = 5/2$$

$$= 2.5s$$

$$V = 346m/s$$

$$S = Vt$$

$$= 346 \times 2.5$$

$$= 865m$$

ٹائم صرف ایک طرف کا لیا جائے گا

$$T = 3.42s \quad \boxed{11.7}$$

$$t = 3.42/2$$

$$= 1.71s$$

$$V = 1531m/s$$

$$S = Vt$$

$$= 1531 \times 1.71$$

$$= 2618m$$

ٹائم صرف ایک طرف کا لیا جائے گا

$$V = 343m/s \quad \boxed{11.8}$$

$$f = 20000Hz$$

(a) بلند ترین فریکوئنسی کے لیے

$$V = f\lambda$$

$$343 = 20000 \times \lambda$$

$$\lambda = 343/20000$$

$$\lambda = 1.7 \times 10^{-2} \text{m}$$

(b) کم ترین فریکوئنسی کے لیے

$$V = f\lambda$$

$$343 = 20 \times \lambda$$

$$\lambda = 343/20 = 17.2 \text{m}$$

$$f = 2 \text{kHz} \quad \boxed{11.9}$$

$$= 2000 \text{Hz}$$

$$\lambda = 35 \text{cm}$$

$$= 35/100$$

$$= 0.35 \text{m}$$

$$S = 1.5 \text{km}$$

$$= 1.5 \times 1000$$

$$= 1500 \text{m}$$

$$V = f\lambda$$

$$= 2000 \times 0.35$$

$$= 700 \text{m/s}$$

$$S = Vt$$

$$t = S/V$$

$$= 1500/700$$

$$= 2.1 \text{s}$$

CHAPTER # 12

Exp: 1, 2, 3, 4

$$p = 10 \text{cm} \quad \boxed{12.1}$$

$$q = -5 \text{cm}$$

ایمیج مرر کے پیچھے، اس لیے نئی آیا

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

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

$$f = -10 \text{cm}$$

(diverging-mirror)

$$HO = 30 \text{cm} \quad \boxed{12.2}$$

$$p = 10.5 \text{cm}$$

$$f = 16 \text{cm}$$

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

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

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

$$= (10.5 - 16)/16 \times 10.5$$

$$1/q = -168/5.5$$

$$q = 30.54 \text{cm}$$

(converging-mirror)

ایمیج کی اونچائی: HI

HO: جسم کی اونچائی

$$HI/HO = q/p$$

$$HI/30 = 30.54/10.5$$

$$HI = 87.26 \text{cm}$$

$$p = 20 \text{cm} \quad \boxed{12.3}$$

$$HI/HO = q/p$$

$$HI/HI = q/p$$

$$1 = q/p$$

$$q = p = 20 \text{cm}$$

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

$$= 1/20 + 1/20$$

$$f = 10 \text{cm}$$

$$p = 34.4 \text{cm} \quad \boxed{12.4}$$

$$q = -5.66 \text{cm}$$

(diverging-mirror)

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

$$= 1/34.4 + 1/(-5.66)$$

$$= (5.66 - 34.4)/34.4 \times 5.66$$

$$f = -194.7/28.74$$

$$= -6.77 \text{cm}$$

$$f = -13.5 \text{cm} \quad \boxed{12.5}$$

$$q = -11.5 \text{cm}$$

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

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

$$1/p = 1/11.5 - 1/13.5$$

$$= (13.5 - 11.5)/11.5 \times 13.5$$

$$p = 155.25/2$$

$$= 77.62 \text{cm}$$

$$f = -8.70 \text{cm} \quad \boxed{12.6}$$

$$HO = 13.2 \text{cm}$$

$$p = 19.3 \text{cm}$$

$$p = 2p = 2(19.3)$$

$$= 38.4 \text{cm}$$

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

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

$$1/q = 1/8.70 + 1/19.3$$

$$= (19.3 - 8.70)/8.70 \times 19.3$$

$$q = 167.91/10.6$$

$$= 15.84$$

(b) ایمیج کی اونچائی

$$HI/HO = q/p$$

$$I/13.2 = 16.84/19.3$$

$$HI = 10.8 \text{cm}$$

(c) ایمیج کی اونچائی

$$HI/HO = q/p$$

$$I/13.2 = 15.84/38.4$$

$$HI = 5.42 \text{cm}$$

$$R = 38 \text{cm} \quad \boxed{12.7}$$

$$f = R/2$$

$$= 38/2$$

$$= 19 \text{cm}$$

$$p = 50 \text{cm}$$

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

$$1/19 = 1/50 + 1/q$$

$$1/q = 1/19 - 1/50$$

$$= (50 - 19)/19 \times 50$$

$$q = 950/31$$

$$= 30.64 \text{cm}$$

ایمیج سیدھی ہوگی

$$HO = 4 \text{cm} \quad \boxed{12.8}$$

$$p = 12 \text{cm}$$

$$f = 8 \text{cm}$$

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

$$1/8 = 1/12 + 1/q$$

$$1/q = (6-4)/48$$

$$q = 24 \text{cm}$$

(b) ایمیج کی اونچائی

$$HI/HO = q/p$$

$$HI/4 = 24/12$$

$$HI = 8 \text{cm}$$

ایمیج، ریل، الٹی، بڑی

$$O = 10 \text{cm} \quad \boxed{12.9}$$

$$p = 20 \text{cm}$$

$$f = -15 \text{cm}$$

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

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

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

$$q = -8.75 \text{cm}$$

$$HI/HO = q/p$$

$$HI/10 = 8.75/20$$

$$HI = 4.28 \text{cm}$$

ایمیج، ورچوئل، سیدھی، بڑی

$$f = 6 \text{cm} \quad \boxed{12.10}$$

$$q/p = 3/1$$

$$q = 3p = -3p$$

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

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

$$p = 4 \text{cm}$$

$$i = 35^\circ \quad \boxed{12.11}$$

$$n = 1.25$$

(a) اینگل آف رفریکشن

$$n = \text{Sini/Sinr}$$

$$1.25 = \text{Sin}35^\circ / \text{Sinr}$$

$$\text{Sinr} = 0.57/1.25$$

$$\text{Sinr} = 0.45$$

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

$$r = 27.32^\circ$$

(b) کرٹیکل اینگل کے لیے

$$n = \text{Sinr/Sini}$$

$$1.25 = \text{Sin}90^\circ / \text{SinC}$$

$$\text{SinC} = 1/1.25$$

$$\text{SinC} = 0.80$$

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

$$= 53.13^\circ$$

$$P = 5D \quad \boxed{12.12}$$

$$f = 1/P$$

$$= 1/5$$

$$= 0.2 \text{m}$$

میٹر کو سینٹی میٹر بنایا

$$f = 20 \text{cm}$$

$$q/p = 2/1$$

$$q = 2p$$

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

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

$$p = 30 \text{cm}$$

CHAPTER # 13

Exp: 1, 2

$$Q = 100 \mu\text{C} \quad \boxed{13.1}$$

$$= 100 \times 10^{-6} \text{C}$$

$$= 10^{-4} \text{C}$$

$$e^- = 1.6 \times 10^{-19} \text{C}$$

$$Q = ne$$

$$n = Q/e$$

$$= 10^{-4} / 1.6 \times 10^{-19}$$

$$= 0.625 \times 10^{-4+19}$$

$$n = 6.25 \times 10^{14}$$

$$q_1 = 10 \mu\text{C} \quad \boxed{13.2}$$

$$= 10 \times 10^{-6} \text{C}$$

$$= 10^{-5} \text{C}$$

$$q_2 = 5 \mu\text{C}$$

$$= 5 \times 10^{-6} \text{C}$$

$$r = 150 \text{cm}$$

$$= 150/100$$

$$= 1.5 \text{m}$$

$$k = 9 \times 10^9 \text{Nm}^2/\text{C}^2$$

$$F = kq_1q_2/r^2$$

$$= 9 \times 10^9 \times 10^{-5} \times 5 \times 10^{-6}$$

$$(1.5)^2$$

$$= 45 \times 10^{9-5-6}/2.25$$

$$F = 20 \times 10^{-2}$$

$$= 20/100$$

$$= 0.2 \text{N}$$

دفع کی فورس، مثبت چارجز

$$F = 0.8 \text{N} \quad \boxed{13.3}$$

$$r = 0.1 \text{m}$$

$$k = 9 \times 10^9 \text{Nm}^2/\text{C}^2$$

$$F = kq_1q_2/r^2$$

$$0.8 = 9 \times 10^9 \times q^2 / (0.1)^2$$

$$q^2 = 0.8 \times 0.01 / 9 \times 10^9$$

$$= 8 \times 10^{-3} / 9 \times 10^9$$

$$= 0.888 \times 10^{-12}$$

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

$$q = 0.942 \times 10^{-6}$$

$$= 9.42 \times 10^{-7} \text{C}$$

$$F = 0.1 \text{N} \quad \boxed{13.4}$$

$$r = 5 \text{cm}$$

$$= 5/100$$

$$= 0.05 \text{m}$$

$$k = 9 \times 10^9 \text{Nm}^2/\text{C}^2$$

$$F = kq_1q_2/r^2$$

$$q^2 = Fr^2/k$$

$$= 0.1 \times (0.05)^2 / 9 \times 10^9$$

$$= 0.1 \times 0.0025 \times 10^{-9} / 9$$

$$q^2 = 2.8 \times 10^{-5} \times 10^{-9}$$

$$= 2.8 \times 10^{-14} \text{C}$$

2cm کے لیے کولمب فورس

$$r = 2 \text{cm}$$

$$= 2/100$$

$$= 0.02m$$

$$q^2 = 2.8 \times 10^{-14}C$$

$$F = kq_1q_2/r^2$$

$$= 9 \times 10^9 \times 2.8 \times 10^{-14}$$

$$(0.02)^2$$

$$= (25.2/0.0004) \times 10^{-14}$$

$$= 63000 \times 10^{-5}$$

$$F = 0.63N$$

$$V = 10^4V \quad \boxed{13.5}$$

$$q = 100\mu C$$

$$= 100 \times 10^{-6}$$

$$= 10^{-4}C$$

$$V = W/q$$

$$10^4 = W/10^{-4}$$

$$W = 10^4 \times 10^{-4}$$

$$= 10^0$$

$$W = 1J$$

$$q = +2C \quad \boxed{13.6}$$

$$V_a = 100V$$

$$V_b = 50V$$

$$W = q(V_a - V_b)$$

$$= 2(100 - 50)$$

$$= 100J$$

$$V = 9V \quad \boxed{13.7}$$

$$Q = 0.06C$$

$$Q = CV$$

$$0.06 = 9 \times C$$

$$C = 0.06/9$$

$$= 6.67 \times 10^{-3}F$$

$$Q_1 = 0.03C \quad \boxed{13.8}$$

$$V_1 = 6V$$

$$Q_2 = 2C$$

مختلف ڈیٹا کے لیے بھی کیپسیٹنس وہی رہے گی کیونکہ کیپیسٹر ایک ہی ہے

$$C = C$$

$$Q_1/V_1 = Q_2/V_2$$

$$V_2 = Q_2 \times V_1 / Q_1$$

$$= 2 \times 6 / 0.03$$

$$= 400V$$

$$C_1 = 6\mu C \quad \boxed{13.9}$$

$$C_2 = 12\mu C$$

$$V = 12V$$

$$1/C_{eq} = 1/C_1 + 1/C_2$$

$$= 1/6 + 1/12$$

$$= 4\mu C$$

سیریز میں تمام کیپیسٹرز پر چارج ایک جیسا ہوگا

$$Q = C_{eq}V$$

$$= 4 \times 10^{-6} \times 12$$

$$= 48 \times 10^{-6}$$

$$= 48\mu C$$

$$V_1 = Q/C_1$$

$$= 48 \times 10^{-6} / 6 \times 10^{-6}$$

$$= 8V$$

$$V_2 = Q/C_2$$

$$= 48 \times 10^{-6} / 12 \times 10^{-6}$$

$$= 4V$$

$$C_1 = 6\mu C \quad \boxed{13.10}$$

$$C_2 = 12\mu C$$

$$V = 12V$$

$$C_{eq} = C_1 + C_2$$

$$= 6 + 12$$

$$= 18\mu F$$

پیرالل میں ہر کیپیسٹر پر پوٹینشل ایک جیسا ہوگا

$$p.d = 12V$$

$$Q_1 = C_1V$$

$$= 6 \times 12$$

$$= 72\mu C$$

$$Q_2 = C_2V$$

$$= 12 \times 12$$

$$= 144\mu C$$

CHAPTER # 14

Exp: 1, 2, 6, 7

$$I = 3mA \quad \boxed{14.1}$$

$$= 3 \times 10^{-3}A$$

$$t = 1mints$$

$$= 60s$$

$$I = Q/t$$

$$3 \times 10^{-3} = Q/60$$

$$Q = 60 \times 3 \times 10^{-3}$$

$$= 180 \times 10^{-3}C$$

$$(a) \quad \boxed{14.2}$$

$$R = 100000\Omega$$

$$V = 12V$$

$$V = IR$$

$$12 = I \times 10^5$$

$$I = 12/10^5$$

$$= 1.2 \times 10^{-4}A$$

(b) گیلی جلد سے کرنٹ

$$R = 1000\Omega$$

$$V = 12V$$

$$V = IR$$

$$12 = I \times 1000$$

$$I = 12/1000$$

$$= 1.2 \times 10^{-2}A$$

$$R = 10M\Omega \quad \boxed{14.3}$$

$$= 10 \times 10^6\Omega$$

$$V = 100V$$

$$V = IR$$

$$100 = I \times 10^7$$

$$I = 100/10^7$$

$$= 1/10^5$$

$$= 1/10^2 \times 10^3$$

$$= (1/100) \times 10^{-3}$$

$$= 0.01mA$$

$$V = 10V \quad \boxed{14.4}$$

$$I = 1.5A$$

$$t = 2mints$$

$$= 120s$$

$$R = V/I$$

$$= 10/1.5$$

$$= 6.667\Omega$$

$$W = I^2Rt$$

$$= (1.5)^2 \times 6.667 \times 120$$

$$W = 1800J$$

$$R_1 = 2k\Omega \quad \boxed{14.5}$$

$$R_2 = 8k\Omega$$

$$V = 10V$$

$$(a) R_e = R_1 + R_2$$

$$= 2 + 8$$

$$= 10k\Omega$$

(b) سیریز میں ہر رزسٹنس پر کرنٹ ایک جیسا ہوگا

$$V = IR_e$$

$$10 = I \times 10 \times 10^3$$

$$I = 1 \times 10^{-3}$$

$$= 1mA$$

(c)

$$V_1 = IR_1$$

$$= 1 \times 10^{-3} \times 2 \times 10^3$$

$$= 2V$$

$$V_2 = IR_2$$

$$= 1 \times 10^{-3} \times 8 \times 10^3$$

$$= 8V$$

$$R_1 = 6k\Omega \quad \boxed{14.6}$$

$$R_2 = 12k\Omega$$

$$V = 6V$$

(a)

$$1/R_e = 1/R_1 + 1/R_2$$

$$= 1/6 + 1/12$$

$$= 4k\Omega$$

(b) پیرالل میں ہر رزسٹنس کے گرد پوٹینشل ایک جیسا ہوگا

$$V = 6V$$

(c)

$$V = I_1R_1$$

$$6 = I_1 \times 6 \times 10^3$$

$$I_1 = 6/6 \times 10^3$$

$$= 1mA$$

$$V = I_2R_2$$

$$6 = I_2 \times 12 \times 10^3$$

$$I_2 = 6/12 \times 10^3$$

$$= 0.5mA$$

$$V = 220V \quad \boxed{14.7}$$

$$P = 100W$$

$$= 5h$$

$$= 30$$

$$t = 5 \times 30$$

$$= 150h$$

$$P = VI$$

$$= V(V/R)$$

$$P = V^2/R$$

$$100 = (220)^2/R$$

$$R = 48400/100$$

$$= 484\Omega$$

$$E = Pxhours/1000$$

$$= 100 \times 150/1000$$

$$= 15kWh$$

$$P = 150W \quad \boxed{14.8}$$

$$R = 95\Omega$$

$$P = VI$$

$$= V(V/R)$$

$$P = V^2/R$$

$$150 = V^2/95$$

$$V^2 = 150 \times 95$$

$$V^2 = 14250$$

$$\sqrt{V^2} = \sqrt{14250}$$

$$V = 120V$$

$$\boxed{14.9}$$

10 بلبوں کے صرف شدہ پوٹنٹس

$$P = 10 \times 60 = 600W$$

$$t = 5 \times 30 = 150h$$

$$E_b = Pxh/1000$$

$$= 600 \times 150/1000$$

$$= 90kWh$$

4 پنکھوں کے صرف شدہ پوٹنٹس

$$P = 4 \times 75 = 300W$$

$$t = 10 \times 30 = 300h$$

$$E_p = Pxh/1000$$

$$= 300 \times 300/1000$$

$$= 90kWh$$

1 ٹی وی کے صرف شدہ پوٹنٹس

$$P = 1 \times 250 = 250W$$

$$t = 2 \times 30 = 60h$$

$$E_t = Pxh/1000$$

$$= 250 \times 60/1000$$

$$= 15kWh$$

1 اسٹری کے صرف شدہ پوٹنٹس

$$P = 1 \times 1000 = 1000W$$

$$t = 2 \times 30 = 60s$$

$$E_i = Pxh/1000$$

$$= 1000 \times 60/1000$$

$$= 60kWh$$

$$U_T = E_b + E_p + E_t + E_i$$

$$= 90 + 90 + 15 + 60$$

$$= 225kWh$$

$$= R_s = 4$$

$$= 4 \times 225 = 1020/-$$

14.10

بلب کے لیے کرنٹ، رزسٹنس

$$P = 100W$$

$$V = 250V$$

(a)

$$P = VI$$

$$100 = 250 \times I$$

$$I = 100/250 = 0.4A$$

(b)

$$V = IR$$

$$250 = 0.4 \times R$$

$$R = 250/0.4 = 625\Omega$$

ہیٹر کے لیے کرنٹ، رزسٹنس

$$P = 4kW = 4000W$$

$$V = 250V$$

(a)

$$P = VI$$

$$4000 = 250 \times I$$

$$I = 4000/250 = 16A$$

(b)

$$V = IR$$

$$250 = 16 \times R$$

$$R = 250/16 = 15.6\Omega$$

$$R = 5.6\Omega$$

$$V = 3V$$

$$I = 0.5A$$

(a) رزسٹر کے لیے پاور

$$P_r = I^2 R$$

$$= (0.5)^2 \times 5.6$$

$$= 1.4W$$

(b) بیٹری کے لیے پاور

$$P_b = VI$$

$$= 3 \times 0.5$$

$$= 1.5W$$

(c) کچھ پاور بیٹری کے اندر وئی

رزسٹنس کی وجہ سے ضائع ہو جاتی ہے

CHAPTER # 15

Exp: 1

$$V_p = 240V$$

$$V_s = 12V$$

$$N_p = 2000$$

$$N_s/N_p = V_s/V_p$$

$$N_s/2000 = 12/240$$

$$N_s = 12 \times 2000/240$$

$$= 100$$

$$N_p = 1$$

$$N_s = 100 \quad (\text{step-up})$$

$$V_p = 20V$$

$$N_s/N_p = V_s/V_p$$

$$100/1 = V_s/20$$

$$V_s = 100 \times 20/1$$

$$= 2000V$$

15.2

$$N_p = 100$$

$$N_s = 1 \quad (\text{step-down})$$

$$V_p = 170V$$

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

$$N_s/N_p = V_s/V_p$$

$$1/100 = V_s/170$$

$$V_s = 1 \times 170/100$$

$$= 1.7V$$

ان پٹ پاور = آؤٹ پٹ پاور

$$V_s I_s = V_p I_p$$

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

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

$$= 0.1A$$

$$V_p = 240V$$

$$V_s = 12V$$

$$N_p = 4000$$

$$I_s = 0.4A$$

$$N_s/N_p = V_s/V_p$$

$$N_s/4000 = 12/240$$

$$N_s = 12 \times 4000/240$$

$$= 200$$

ان پٹ پاور = آؤٹ پٹ پاور

$$V_s I_s = V_p I_p$$

$$12 \times 0.4 = 240 \times I_p$$

$$I_p = 12 \times 0.4/240$$

$$= 0.02A$$

$$P = 500MW$$

$$= 500 \times 10^6W$$

$$V = 250kV$$

$$= 250 \times 10^3V$$

$$P = VI$$

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

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

$$= 2 \times 10^3A$$

$$P_{gen} = 150kW$$

$$= 150 \times 10^3W$$

$$V_{wire} = 10000V$$

$$R = 2\Omega$$

$$S = 5km$$

$$= 5000m$$

تار میں پاور ہیز بیٹر کی وجہ سے

$$P_{gen} = P_{wire}$$

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

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

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

$$= 15A$$

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 ٹرانسمارمر کو تار سے جو وولٹیج ملا

$$V_T = V_{in} - V_d$$

$$= 10000 - 30$$

$$= 9970V$$

CHAPTER # 18

Exp: 1, 2, 4

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

آخری ہاف لائف تک دیا گیا عرصہ

$$T_p = 29.2s$$

$$T_p = n T_{1/2}$$

$$29.2 = n \times 7.3$$

$$n = 29.2/7.3 = 4$$

$$N = N_0/2^n$$

$$= N_0/2^4$$

$$= N_0/16$$

سولہ واں حصہ باقی رہ جائے گا

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

$$T_p = 26Y$$

$$T_p = n T_{1/2}$$

$$26 = n \times 5.25$$

$$n = 26/5.25 = 5$$

$$N = N_0/2^n$$

$$= N_0/2^5$$

$$= N_0/32$$

بیس واں حصہ باقی رہ جائے گا

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

$$T_p = 26Y$$

$$T_p = n T_{1/2}$$

$$= 3 \times 5730$$

$$= 17190$$

$$= 1.7 \times 10^4Y$$

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

$$T_p = 36h$$

$$T_p = n T_{1/2}$$

$$36 = n \times 6$$

$$n = 36/6 = 6$$

$$N = N_0/2^n$$

$$= N_0/2^6$$

$$= N_0/64$$

$$= 3.12mg$$

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

$$T_p = 36h$$

$$T_p = n T_{1/2}$$

$$36 = n \times 10$$

$$n = 36/10 = 3.6$$

$$N = N_0/2^n$$

$$= N_0/2^{3.6}$$

$$= 200mg$$

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

$$T_p = 36h$$

$$T_p = n T_{1/2}$$

$$36 = n \times 10$$

$$n = 36/10 = 3.6$$

$$N = N_0/2^n$$

$$= N_0/2^{3.6}$$

$$= 200mg$$

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

$$N_0 = \text{اصل مقدار}$$

$$= 368c/m$$

$$N = N_0/2^n$$

$$23 = 368/2^n$$

$$2^n = 368/23$$

$$2^n = 16$$

$$2^n = 2^4$$

$$n = 4$$

$$T_p = n T_{1/2}$$

$$= 4 \times 10$$

$$= 40mint$$

دو ہاف لائف کے بعد

$$T_p = 4mint$$

$$T_p = n T_{1/2}$$

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

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

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

$$N_0 = \text{اصل مقدار}$$

$$= 32000c/m$$

$$N = N_0/2^n$$

$$N_0/16 = N_0/2^n$$

$$16 = 2^n$$

$$2^4 = 2^n$$

$$n = 4$$

$$T_p = n T_{1/2}$$

$$= 4 \times 1500$$

$$= 6000Y$$

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

$$t = 8h$$

$$C.R = 310,300,280,$$

$$270,312,305,290$$

$$N = N_0/2^n$$

$$N_0/8 = N_0/2^n$$

$$1/8 = 1/2^n$$

$$8 = 2^n$$

$$n = 3$$

$$T_p = n T_{1/2}$$

$$= 3 \times 5730$$

$$= 17190Y$$

بہت کم ہے

$$N_0 = \text{اصل مقدار}$$

$$N = N_0/2^n$$

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

$$N = N_0/2^n$$

$$N_0/8 = N_0/2^n$$

$$1/8 = 1/2^n$$

$$8 = 2^n$$

$$n = 3$$

$$T_p = n T_{1/2}$$

$$= 3 \times 5730$$

$$= 17190Y$$

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