

SJ PAPERS

9TH & 10TH NUMERICALS ACCORDING TO ALP

<p>NUMERICAL 9TH</p> <p>CHAPTER # 01</p> <p>(a) 5000g 1.1 $5 \times 10^3 \text{g} = 5 \text{kg}$</p> <p>(b) 2000000W $= 2 \times 10^6 \text{W} = 2 \text{MW}$</p> <p>(c) $52 \times 10^{-10} \text{kg}$ $= 52 \times 10^{-10} \times 10^3 \text{g}$ $= 52 \times 10^{-7} \text{g}$ $= 5.2 \times 10^{-6} \text{g}$ $= 5.2 \mu\text{g}$</p> <p>(d) $225 \times 10^{-10} \text{s}$ $= 2.25 \times 10^{-8} \text{s}$ $= 2.25 \mu\text{s}$</p> <p>$1 \text{p} = 10^{-12}$ / $1 \text{n} = 10^{-9}$ $1 \mu = 10^{-6}$ / $1 \text{u} = 10^3 \text{n}$ $1 \text{n} = 10^3$ / $1 \text{u} = 10^6 \text{p}$</p> <p>بال بڑھنے کی شرح 1.3 $= V = d/t$ $= 1 \text{mm}/1 \text{day}$ $= 1 \times 10^{-3}/86400$ $= 1.157 \times 10^{-5} \times 10^{-3}$ $= 1.157 \times 10^{-8}$ $= 11.57 \times 10^{-9}$ $= 11.57 \text{nm/s}$</p> <p>(a) 1168×10^{-27} 1.4 $= 1.168 \times 10^{-27+3}$ $= 1.168 \times 10^{-24}$</p> <p>(b) 32×10^5 $= 3.2 \times 10^{5+1} = 3.2 \times 10^6$</p> <p>(c) $725 \times 10^{-5} \text{kg}$ $= 725 \times 10^{-5} \times 10^3 \text{g}$ $= 725 \times 10^{-2} \text{g}$ $= 7.25 \text{g}$</p> <p>(d) $0.02 \times 10^{-8} =$ $2 \times 10^{-8-2} = 2 \times 10^{-10}$</p> <p>(a) 6400km 1.5 $= 6.4 \times 10^3 \text{km}$</p> <p>(b) 380000km $= 3.8 \times 10^5 \text{km}$</p> <p>(c) 300000000m/s $= 3 \times 10^8 \text{m/s}$</p> <p>(d) ایک دن میں سیکنڈ = $= 24 \times 60 \times 60 \text{s}$ $= 86400 \text{s}$ $= 8.64 \times 10^4 \text{s}$</p> <p>زیر وائر $= 0.01 \times 4$ 1.6 $= 0.04 \text{cm}$</p> <p>زیر و کورکیشن $= -0.04 \text{cm}$</p>	<p>درجوں کی تعداد = 50 1.7 سکریو کی پیچ $= 0.5 \text{mm}$ L.C = pitch/darje $= 0.5/50 = 0.01 \text{cm}$</p> <p>$0.00309 \text{kg} = 3$ 1.8 $5.05 \times 10^{-27} = 3$</p> <p>$1.009 \text{m} \times 4$ 1.9 $0.00450 \text{kg} = 3$ $1.66 \times 10^{-27} \text{kg} = 3$ $2001 \text{s} = 4$</p> <p>لمبائی = 6.7cm 1.10 چوڑائی = 5.4cm</p> <p>رقبہ = $L \times W = 6.7 \times 5.4$ $36.78 \text{cm}^2 = 36 \text{cm}^2$</p> <p>CHAPTER # 02</p> <p>$V = 36 \text{km/h}$ 2.1 $= 36 \times 1000 \text{m}/3600$ $V = 10 \text{m/s}$ $t = 10 \text{s}$ $S = V \times t$ $= 10 \times 10 = 100 \text{m}$</p> <p>$V_i = 0$ 2.2 $S = 1000 \text{m}$ $t = 100 \text{s}$ $V_f = ?$ $S = V_i t + \frac{1}{2} a t^2$ $1000 = 0 \times 100 + \frac{1}{2}$ $\times a \times (100)^2$ $a = 0.2 \text{m/s}^2$ $V_f = V_i + a t$ $= 0 + 0.2 \times 100 = 20 \text{m/s}$</p> <p>$V_i = 10 \text{m/s}$ 2.3 $a = 0.2 \text{m/s}^2$ $t = 30 \text{s}$ $S = ?$ $V_f = ?$ $V_f = V_i + a t^2$ $= 10 + 0.2 \times 30$ $= 10 + 6 = 16 \text{m/s}$ $S = V_i t + \frac{1}{2} a t^2$ $= 10 \times 30 + \frac{1}{2} \times 0.2 \times (30)^2$ $= 300 + \frac{1}{2} \times 0.2 \times 900$ $= 300 + 90 = 390 \text{m}$</p> <p>$V_i = 30 \text{m/s}$ 2.4 $V_f = 0$ $g = -10 \text{m/s}^2$ $h = ?$ $2gh = V_f^2 - V_i^2$ $2(-10)h = (0)^2 - (30)^2$</p>	<p>$-20h = -900$ $h = -900/-20$ $h = 45 \text{m}$ واپسی کا ٹائم $= t = 3 \text{s}$</p> <p>پانچ سیکنڈ میں طے فاصلہ 2.5 $V_i = 40 \text{m/s}$ $t = 5 \text{s}$ $S_1 = V \times t$ $S_1 = 40 \times 5 = 200 \text{m}$</p> <p>دس سیکنڈ میں طے فاصلہ $V_i = 40 \text{m/s}$ $V_f = 0$ $t = 10 \text{s}$ $V_{av} = V_f - V_i/2$ $= 0 + 40/2 = 20 \text{m/s}$ $S_2 = V \times t$ $S_2 = 20 \times 10 = 200 \text{m}$</p> <p>کل فاصلہ $= S_1 + S_2$ $= 200 + 200 = 400 \text{m}$ Retardation $a_{av} = V_f - V_i/t$ $= 0 - 40/10 = -40/10$ $= -4 \text{m/s}^2$</p> <p>$V_i = 0$ 2.6 $a = 0.5 \text{m/s}^2$ $S = 100 \text{m}$ $V_f = ?$ $2aS = V_f^2 - V_i^2$ $2(0.5)100 = V_f^2 - (0)^2$ $V_f^2 = 100$ $V_f = 10 \text{m/s}^2$ $V_f = 10 \times 3600/1000$ $V_f = 36 \text{km/h}$</p> <p>دو منٹ میں طے فاصلہ 2.7 $V_i = 0$ $V_f = 48 \text{km/h}$ $= 13.33 \text{m/s}$ $t = 2 \text{mint} = 2 \times 60$ $= 120 \text{s}$ $V_{av} = V_f - V_i/2$ $= 0 + 13.33/2$ $= 6.66 \text{m/s}$ $S_1 = V_{av} \times t$ $= 6.66 \times 120$ $= 800 \text{m}$</p> <p>پانچ منٹ میں طے فاصلہ $V = 13.33 \text{m/s}$ $t = 5 \text{mint} = 5 \times 60$ $= 300 \text{s}$</p>	<p>$S_2 = V \times t$ $= 13.66 \times 300$ $= 4000 \text{m}$</p> <p>تین منٹ میں طے فاصلہ $V_i = 13.66 \text{m/s}$ $V_f = 0$ $t = 3 \text{mint} = 3 \times 60$ $= 180 \text{s}$ $V_{av} = V_f - V_i/2$ $= 0 + 13.66/2$ $= 6.66 \text{m/s}$ $S_3 = V_{av} \times t$ $= 6.66 \times 180$ $= 1200 \text{m}$</p> <p>کل فاصلہ $= S_1 + S_2 + S_3$ $= 800 + 4000 + 1200$ $= 6000 \text{m}$</p> <p>اوپر جانے کا وقت 2.8 $t = 6/2 = 3 \text{s}$ $g = -10 \text{m/s}^2$ $V_f = 0$ $h = ?$ $V_i = ?$ $V_f = V_i + g t$ $0 = V_i + (-10) \times 3$ $V_i = 30 \text{m/s}$ $2gh = V_f^2 - V_i^2$ $2(-10)h = (0)^2 - (30)^2$ $-20h = -900$ $h = -900/-20 = 45 \text{m}$</p> <p>$S = 800 \text{m}$ 2.9 $V_i = 96 \text{km/h}$ $= 26.67 \text{m/s}$ $V_f = 48 \text{km/h}$ $= 13.33 \text{m/s}$ $a = ?$ $2aS = V_f^2 - V_i^2$ $2 \times a \times 800 =$ $(13.33)^2 - (26.67)^2$ $1600a =$ $177.68 - 711.28$ $a = -533.6/1600$ $= -0.3335 \text{m/s}^2$</p> <p>اس ایکسپریس سے طے فاصلہ $V_i = 13.33 \text{m/s}$ $V_f = 0$ $a = -0.3335 \text{m/s}^2$ $S = ?$ $2aS = V_f^2 - V_i^2$ $2 \times (-0.3335) \times S =$ $(0)^2 - (13.33)^2$</p>
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$0.667xS = -177.66$ $S = -177.66/-0.667$ $S = 266.4m$ $V_i = 26.67m/s$ [2.10] $V_f = 0$ $a = -0.3335m/s^2$ $V_f = V_i + at$ $t = (V_f - V_i)/a$ $t = 0 - 26.67/-0.3335$ $t = 80s$ CHAPTER # 03 $F = 20N$ [3.1] $a = 2m/s^2$ $F = ma$ $m = F/a$ $= 20/2 = 10kg$ $W = 147N$ [3.2] $g = 10m/s^2$ $W = mg$ $m = W/g$ $= 147/10 = 14.7kg$ $m = 10kg$ [3.3] $g = 10m/s^2$ $W = mg \Rightarrow F$ $= 10 \times 10 = 100N$ $F = 100N$ [3.4] $m = 50kg$ $F = ma$ $a = F/m$ $= 100/50 = 2m/s^2$ $W = 20N$ [3.5] $a = 2m/s^2$ $g = 10m/s^2$ $W = mg$ $m = W/g$ $= 20/10 = 2kg$ $F = ma$ $= 2 \times 2 = 4N$ $ساری فورس = W + F$ $F = 20 + 4 = 24N$ $m_1 = 52kg$ [3.6] $m_2 = 48kg$ $g = 10m/s^2$ $a = \frac{(m_1 - m_2)g}{m_1 + m_2}$ $= (52 - 48) \times 10 / 52 + 48$ $= 4 \times 10 / 100 = 40 / 100$ $a = 0.4m/s^2$ $T = \frac{2m_1m_2g}{m_1 + m_2}$	$= 2 \times 52 \times 48 \times 10 / 100$ $= 49920 / 100$ $T = 500N$ $m_1 = 24kg$ [3.7] $m_2 = 26kg$ $g = 10m/s^2$ $a = \frac{m_1g}{m_1 + m_2}$ $= 24 \times 10 / 24 + 26$ $a = 240 / 50 = 4.8m/s^2$ $T = m_1m_2g / m_1 + m_2$ $= 24 \times 26 \times 10 / 24 + 26$ $T = 6240 / 50 = 125N$ $\Delta P = 22Ns$ [3.8] $F = 20N$ $F = \Delta P / t$ $t = \Delta P / F = 22 / 20$ $t = 1.1s$ $m = 5kg$ [3.9] $\mu = 0.6$ $F_s = \mu F = \mu mg$ $F_s = 0.6 \times 5 \times 10 = 30N$ $m = 0.5kg$ [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 $F_x = 10 - 4 = 6N$ [4.1] $F_y = 6N$ $F = \sqrt{F_x^2 + F_y^2}$ $F = \sqrt{6^2 + 6^2}$ $F = \sqrt{72} = 8.5N$ $\theta = \tan^{-1}(F_y / F_x)$ $\theta = \tan^{-1}(6/6)$ $\theta = \tan^{-1}(1) = 45^\circ$ $F = 50N$ [4.2] $\theta = 30^\circ$ $F_x = F \cos \theta$ $= 50 \cos 30^\circ$ $= 50 \times 0.866 = 43.3N$ $F_y = F \sin \theta$ $= 50 \sin 30^\circ$ $= 50 \times 0.5 = 25N$ $F_x = 12N$ [4.3] $F_y = 5N$ $F = \sqrt{F_x^2 + F_y^2}$ $F = \sqrt{12^2 + 5^2}$ $F = \sqrt{169} = 13N$	$\theta = \tan^{-1}(F_y / F_x)$ $\theta = \tan^{-1}(5/12)$ $= 22.6^\circ$ $F = 100N$ [4.4] $r = 10cm = 0.1m$ $\tau = rF$ $= 0.1 \times 100 = 10Nm$ $F_x = 20N$ [4.5] $\theta = 30^\circ$ $F_x = F \cos \theta$ $F = F_x / \cos \theta$ $= 20 / \cos 30^\circ$ $= 20 / 0.866$ $= 23.1N$ $F = 50N$ [4.6] $r = 16cm = 0.16m$ $کپل کا ٹارک =$ $\tau = 2rF$ $= 2 \times 0.16 \times 50 = 16Nm$ $T_1 = 3.8N$ [4.7] $T_2 = 4.4N$ $W = T_1 + T_2$ $= 3.8 + 4.4 = 8.2N$ $m_1 = 3kg$ [4.8] $m_2 = 5kg$ $T_1 = mg$ $= 3 \times 10 = 30N$ $T_2 = (m_1 + m_2)g$ $= (3 + 5) \times 10$ $= 80N$ $F_1 = 200N$ [4.9] $r_1 = 20cm = 0.2m$ $F_2 = 150N$ $r_2 = ?$ $T_1 = T_2$ $F_1r_1 = F_2r_2$ $r_2 = F_1r_1 / F_2$ $= 0.1 \times 200 / 150$ $= 0.133m = 13.3cm$ $m = 10kg$ [4.10] $F_1 = mg$ $F_1 = 10 \times 10 = 100N$ $r_1 = 20cm = 0.2m$ $r_2 = 50cm = 0.5m$ $F_2 = ?$ $اُنٹی گراؤک وائبر = گراؤک وائبر$ $F_2r_2 = F_1r_1$ $F_2 = F_1r_1 / r_2$ $= 100 \times 0.2 / 0.5$ $= 20 / 0.5 = 40N$	CHAPTER # 05 $m_1 = 1000kg$ [5.1] $m_2 = 1000kg$ $d = 0.5m$ $G = 6.67 \times 10^{-11} Nm^2/kg^2$ $F = Gm_1m_2/d^2$ $= G \times 10^3 \times 10^3 / (0.5)^2$ $= 6.67 \times 10^{-11} \times 10^6 / 0.25$ $= 26.7 \times 10^{-11+6}$ $= 26.7 \times 10^{-5}$ $= 2.67 \times 10^{-4} N$ $m = m_1 = m_2 = ?$ [5.2] $F = 0.006673N$ $d = 1m$ $G = 6.67 \times 10^{-11} Nm^2/kg^2$ $F = Gm_1m_2/d^2$ $m^2 = Fd^2/G$ $= \frac{0.006673(1)^2}{6.673 \times 10^{-11}}$ $= \frac{6.673 \times 10^{-3}}{6.673 \times 10^{-11}}$ $m^2 = 1 \times 10^{-3+11}$ $= 10^8$ $\sqrt{m^2} = \sqrt{10^8}$ $m = 10000kg$ $M_m = 6.42 \times 10^{23}kg$ $R_m = 3370km$ [5.3] $= 3.370 \times 10^6m$ $G = 6.67 \times 10^{-11} Nm^2/kg^2$ $g_m = GM_m/R^2$ $= \frac{6.673 \times 10^{-11} \times 6.42 \times 10^{23}}{(3.370 \times 10^6)^2}$ $= \frac{42.84 \times 10^{12-11}}{11.35 \times 10^{12-12}}$ $= 3.77 \times 10^{12-12}$ $= 3.77 \times 10^0$ $g_m = 3.77m/s^2$ $g_m = 1.62m/s^2$ [5.4] $R_m = 1740km$ $= 1.740 \times 10^6m$ $G = 6.67 \times 10^{-11} Nm^2/kg^2$ $M_m = g_m R^2 / G$ $= \frac{1.62 \times (1.74 \times 10^6)^2}{6.673 \times 10^{-11}}$ $= \frac{1.62 \times 3.027 \times 10^{12}}{6.673 \times 10^{-11}}$ $= \frac{4.904712 \times 10^{12+11}}{6.673}$ $= 0.735 \times 10^{23}$ $M_m = 7.35 \times 10^{22}kg$ $h = 3600km$ [5.5] $= 3.6 \times 10^6m$
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$$\begin{aligned}
 R &= 6.4 \times 10^6 \text{m} \\
 M_e &= 6 \times 10^{24} \text{kg} \\
 g_m &= GM/(R+h)^2 \\
 &= \frac{6.67 \times 10^{-11} \times 6 \times 10^{24}}{(6.4 \times 10^6 + 3.6 \times 10^6)^2} \\
 &= \frac{40.038 \times 10^{13}}{(10 \times 10^6)^2} \\
 &= \frac{40.038 \times 10^{13}}{100 \times 10^{12}} \\
 &= 0.4 \times 10^{13-12} \\
 &= 0.4 \times 10^1 \\
 g_m &= 4 \text{m/s}^2 \\
 R &= 48700 \text{km} \quad [5.6] \\
 &= 48.7 \times 10^6 \text{m} \\
 g &= GM/R^2 \\
 &= \frac{6.67 \times 10^{-11} \times 6 \times 10^{24}}{(48.7 \times 10^6)^2} \\
 &= \frac{40.038 \times 10^{13}}{2371.69 \times 10^{12}} \\
 &= 0.017 \times 10^{13-11} \\
 &= 0.017 \times 10^1 \\
 g &= 0.17 \text{m/s}^2 \\
 R &= 10000 \text{km} \quad [5.7] \\
 &= 10^7 \text{m} \\
 g &= 4 \text{m/s}^2 \\
 M_e &= gR^2/G \\
 &= \frac{4 \times (10^7)^2}{6.67 \times 10^{-11}} \\
 &= 0.599 \times 10^{14+11} \\
 &= 0.599 \times 10^{25} \\
 M &= 5.99 \times 10^{24} \text{kg} \\
 g_h &= \frac{1}{4} g \quad [5.8] \\
 g_h &= GM/(R+h)^2 \\
 (R+h)^2 &= GM/g_h \\
 &= GM/ \frac{1}{4} g \\
 (R+h)^2 &= 4GM/g \\
 &\text{دونوں طرف جذری} \\
 \sqrt{(R+h)^2} &= \sqrt{4GM/g} \\
 R+h &= \sqrt{4R^2} \\
 R+h &= 2R \\
 h &= 2R-R \\
 h &= R \\
 h &= 850 \text{km} \quad [5.9] \\
 h &= 0.85 \times 10^6 \text{m} \\
 V_0 &= (GM/R+h)^{1/2} \\
 &= \frac{(6.673 \times 10^{-11} \times 6 \times 10^{24})^{1/2}}{(0.85 \times 10^6 + 6.4 \times 10^6)^{1/2}} \\
 &= \frac{(40.038 \times 10^{13})^{1/2}}{[(0.85+6.4) \times 10^6]^{1/2}} \\
 &= \frac{(40.038 \times 10^{13})^{1/2}}{(7.25)^{1/2}}
 \end{aligned}$$

$$\begin{aligned}
 &= (5.522 \times 10^7)^{1/2} \\
 &= (55.22 \times 10^6)^{1/2} \\
 &= 7.431 \times 10^3 \\
 V_0 &= 7431 \text{m/s} \\
 h &= 42000 \text{km} \quad [5.10] \\
 &= 42 \times 10^6 \text{m} \\
 V_0 &= (GM/R+h)^{1/2} \\
 &= \frac{(6.673 \times 10^{-11} \times 6 \times 10^{24})^{1/2}}{(42 \times 10^6 + 6.4 \times 10^6)^{1/2}} \\
 &= \frac{(40.038 \times 10^{13})^{1/2}}{[(42+6.4) \times 10^6]^{1/2}} \\
 &= \frac{(40.038 \times 10^{13})^{1/2}}{(48.4)^{1/2}} \\
 &= (0.8272 \times 10^7)^{1/2} \\
 &= (8.272 \times 10^6)^{1/2} \\
 &= 2.876 \times 10^3 \\
 V_0 &= 2876 \text{m/s} \\
 \text{CHAPTER \# 06} \\
 F &= 300 \text{N} \quad [6.1] \\
 d &= 35 \text{m} \\
 W &= Fd \\
 &= 300 \times 35 = 10500 \text{J} \\
 W &= mg = 20 \text{N} \quad [6.2] \\
 h &= 6 \text{m} \\
 P.E &= mgh \\
 &= 20 \times 6 = 120 \text{J} \\
 W &= 12 \text{kN} \quad [6.3] \\
 &= 12000 \text{N} \\
 V &= 20 \text{m/s} \\
 m &= W/g \quad (w=mg) \\
 &= 12000/10 = 1200 \text{kg} \\
 K.E &= \frac{1}{2} mV^2 \\
 &= \frac{1}{2} \times 1200 \times (20)^2 \\
 &= 600 \times 400 \\
 &= 240000 \\
 &= 240 \times 10^3 = 240 \text{kJ} \\
 m &= 500 \text{g} \quad [6.4] \\
 &= 0.5 \text{kg} \\
 V &= 15 \text{m/s} \\
 K.E &= \frac{1}{2} mV^2 \\
 &= \frac{1}{2} \times 500 \times (0.5)^2 \\
 &= 0.5 \times 225/2 \\
 K.E &= 56.25 \text{J} \\
 &\text{کنٹرولیشن آف انرجی کے قانون کے مطابق} \\
 P.E &= 56.25 \text{J} \\
 h &= 6 \text{m} \quad [6.5] \\
 V &= 1.5 \text{m/s} \\
 m &= 40 \text{kg} \\
 P.E &= mgh \\
 &= 40 \times 10 \times 6 = 2400 \text{J}
 \end{aligned}$$

$$\begin{aligned}
 K.E &= \frac{1}{2} mV^2 \\
 &= \frac{1}{2} 40 \times (1.5)^2 \\
 &= 20 \times 2.25 = 45 \text{J} \\
 V &= 4 \text{m/s} \quad [6.6] \\
 F &= 4000 \text{N} \\
 P &= W/t = F.d/t \\
 P &= F.V = 4000 \times 4 \\
 &= 16000 \text{W} = 16 \text{kW} \\
 F &= 300 \text{N} \quad [6.7] \\
 d &= 50 \text{m} \\
 t &= 60 \text{s} \\
 P &= W/t = F.d/t \\
 P &= 300 \times 50/60 \\
 &= 250 \text{W} \\
 m &= 50 \text{kg} \quad [6.8] \\
 t &= 20 \text{s} \\
 \text{سیڑھی کی لمبائی} &= 16 \text{cm} \\
 &= 16/100 = 0.16 \text{m} \\
 \text{سیڑھیوں کی تعداد} &= 25 \\
 h &= 25 \times 0.16 = 4 \text{m} \\
 P &= W/t = mgh/t \\
 &= 50 \times 10 \times 4/20 \\
 &= 100 \text{W} \\
 m &= 200 \text{kg} \quad [6.9] \\
 h &= 6 \text{m} \\
 t &= 10 \text{s} \\
 P &= W/t = mgh/t \\
 &= 200 \times 10 \times 6/10 \\
 &= 1200 \text{W} \\
 P &= 1 \text{hp} = 746 \text{W} \\
 t &= 10 \text{mint} = 600 \text{s} \\
 m &= 800 \text{kg} \quad [6.10] \\
 h &= 15 \text{m} \\
 W &= Pxt \quad (P=W/t) \\
 &= 746 \times 600 \\
 \text{input} &= 447600 \text{J} \\
 W &= mgh \\
 &= 800 \times 10 \times 15 \\
 \text{output} &= 120000 \text{J} \\
 E_f &= (\text{output/input}) 100 \\
 &= \frac{120000}{447600} \times 100 \\
 E_f &= 26.8\% \\
 \text{CHAPTER \# 07} \\
 m &= 850 \text{g} \quad [7.1] \\
 &= 850/1000 = 0.85 \text{kg} \\
 V &= 40 \text{cm} \times 10 \text{cm} \times 5 \text{cm} \\
 &= \frac{40}{100} \times \frac{10}{100} \times \frac{5}{100} \\
 &= 0.4 \text{m} \times 0.1 \text{m} \times 0.05 \text{m} \\
 V &= 0.002 \text{m}^3
 \end{aligned}$$

$$\begin{aligned}
 \rho &= m/V \\
 &= 0.85/0.002 \\
 &= 425 \text{kg/m}^3 \\
 m &= 1 \text{L} = 1 \text{kg} \quad [7.2] \\
 \rho &= 0.92 \text{kg/L} \\
 V &= m/\rho \\
 &= 1/0.92 = 1.09 \text{L} \\
 (a) \quad m &= 5 \text{kg} \quad [7.3] \\
 \rho &= 8200 \text{kg/m}^3 \\
 V &= m/\rho = 5/8200 \\
 &= 6.01 \times 10^{-4} \text{m}^3 \\
 (b) \quad m &= 200 \text{g} \\
 &= 200/1000 = 0.2 \text{kg} \\
 \rho &= 11300 \text{kg/m}^3 \\
 V &= m/\rho = 0.2/11300 \\
 &= 1.77 \times 10^{-5} \text{m}^3 \\
 (c) \quad m &= 0.2 \text{kg} \\
 \rho &= 19300 \text{kg/m}^3 \\
 V &= m/\rho = 0.2/19300 \\
 &= 1.04 \times 10^{-5} \text{m}^3 \\
 \rho &= 1.3 \text{kg/m}^3 \quad [7.4] \\
 V &= 8 \text{m} \times 5 \text{m} \times 4 \text{m} \\
 &= 160 \text{m}^3 \\
 m &= \rho \times V \\
 &= 160 \times 1.3 \\
 &= 208 \text{kg} \\
 F &= 75 \text{N} \quad [7.5] \\
 A &= 1.5 \text{cm}^2 \\
 &= \frac{1.5 \text{m} \times 1.5 \text{m}}{100 \times 100} \\
 &= 0.015 \text{m} \times 0.015 \text{m} \\
 &= 0.000225 \text{m}^2 \\
 P &= F/A \\
 &= 75/0.000225 \\
 &= 3.33 \times 10^5 \text{Pa} \\
 L &= 10 \text{mm} \quad [7.6] \\
 &= 10/1000 = 0.01 \text{m} \\
 A &= L \times L = 0.01 \times 0.01 \\
 &= 1 \times 10^{-4} \text{m}^2 \\
 F &= 20 \text{N} \\
 P &= F/A = 20/10^{-4} \\
 &= 2 \times 10^5 \text{N/m}^2 \\
 m &= 1000 \text{g} = 1 \text{kg} \quad [7.7] \\
 A &= 7.5 \text{cm} \times 7.5 \text{cm} \\
 &= \frac{7.5 \text{m} \times 7.5 \text{m}}{100 \times 100} \\
 &= 0.075 \text{m} \times 0.075 \text{m} \\
 A &= 0.005625 \text{m}^2 \\
 F &= mg \\
 &= 1 \times 10 = 10 \text{N} \\
 P &= F/A
 \end{aligned}$$

$$= 10/0.005625$$

$$= 1778 \text{ N/m}^2$$


$$V = \frac{20\text{cm}}{100} \times \frac{7.5\text{cm}}{100} \times \frac{7.5\text{cm}}{100}$$

$$= 0.2\text{m} \times 0.075\text{m} \times 0.075\text{m}$$

$$V = 0.001125 \text{ m}^3$$

$$\rho = m/V$$

$$= 1/0.001125$$

$$= 888.89 \text{ kg/m}^3$$

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

$$W_{\text{water}} = 11.4 \text{ N}$$

$$D = (W_{\text{air}}/W_{\text{air}} - W_{\text{wat}})/\rho$$

$$D = (18/6.6) \times 1000$$

$$= 2727 \text{ kg/m}^3 \text{ (Al)}$$

$$W = 3.06 \text{ N}$$
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 پمپن 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 پمپن کا ایریا

$$d = 3 \text{ cm}$$

$$r = d/2 = 3/2$$

$$= 1.5 \text{ cm} = 0.015 \text{ m}^2$$

$$a = \pi r^2$$

$$= 3.14 \times (0.015)^2$$

$$= 0.0007065 \text{ m}^2$$

$$F_2/A = F_1/a$$

$$F_1 = F_2 x a/A$$

$$= 20000 \times 0.0007065$$

$$0.07065$$

$$F_1 = 14.13/0.07065$$

$$F_1 = 200 \text{ N}$$

$$A = 2 \times 10^{-5} \text{ m}^2$$
7.12

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

$$\text{اصل لمبائی} = L = 2 \text{ m}$$

$$\Delta L = 2 \text{ mm}$$

$$= 2/1000 = 0.002 \text{ m}$$

$$Y = FxL/Ax\Delta L$$

$$= 4000 \times 2/2 \times 10^{-5} \times 0.002$$

$$= 8000/4 \times 10^{-8}$$

$$Y = 2 \times 10^{11} \text{ N/m}^2$$

CHAPTER # 08

$$C = 50^\circ\text{C}$$
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

$$T_1 = 15^\circ\text{C} = 288 \text{ K}$$

$$T_2 = 40^\circ\text{C} = 313 \text{ K}$$

$$\beta = 3.67 \times 10^{-3} \text{ K}^{-1}$$

$$V = V_0 (1 + \beta \Delta T)$$

$$= 1.2 [1 + 3.67 \times 10^{-3} \times (313 - 288)]$$

$$= 1.2 [1 + 3.67 \times 10^{-3} \times (25)]$$

$$= 1.2 [1 + 0.09175]$$

$$V = 1.3 \text{ m}^3$$

$$m = 0.5 \text{ kg}$$
8.5

$$T_1 = 10^\circ\text{C} = 283 \text{ K}$$

$$T_2 = 65^\circ\text{C} = 338 \text{ K}$$

$$C = 4200 \text{ J/kgK}$$

$$\Delta Q = Cm\Delta T$$

$$= 0.5 \times 4200 \times (338 - 283)$$

$$= 05 \times 4200 \times 55$$

$$\Delta Q = 115500 \text{ J}$$

$$\Delta Q = 1000 \text{ J/s}$$
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

$$H_f = 336000 \text{ K/kg}$$

$$m = \Delta Q/H_f \quad (\Delta Q = H_m)$$

$$m = 50000/336000$$

$$= 0.149 \text{ kg}$$

$$= 150 \text{ g}$$

$$m = 100 \text{ g} = 0.1 \text{ kg}$$

برف کو گرم کرنے کے لیے درکار

حرارت

$$Q_1 = Cm\Delta T \quad (-10 \rightarrow 0)$$

$$= 2100 \times 0.1 [0 - (-10)]$$

$$Q_1 = 2100 \text{ J}$$
8.8

برف کو پگھلانے کے لیے درکار

حرارت

$$Q_2 = mH_f \quad (@ 0^\circ\text{C})$$

$$= 0.1 \times 336000$$

$$Q_2 = 33600 \text{ J}$$

پانی کو گرم کرنے کے لیے درکار

حرارت

$$Q_3 = Cm\Delta T \quad (0 \rightarrow 10)$$

$$= 4200 \times 0.1 (10 - 0)$$

$$Q_3 = 4200 \text{ J}$$

$$Q_1 + Q_2 + Q_3 = \text{کل حرارت}$$

$$= 2100 + 33600 + 4200$$

$$Q = 39900 \text{ J}$$

$$m = 100 \text{ g} = 0.1 \text{ kg}$$

$$T = 100^\circ\text{C}$$
8.9

$$H_v = 2.26 \times 10^6 \text{ J/kg}$$

$$\Delta Q = mH_v$$

$$= 0.1 \times 2.26 \times 10^6$$

$$= 2.26 \times 10^5 \text{ J}$$

$$m_{\text{steam}} = 5 \text{ g}$$
8.10

$$= 5/1000 = 0.005 \text{ kg}$$

$$m_{\text{water}} = 500 \text{ g}$$

$$= 500/1000 = 0.5 \text{ kg}$$

پانی کی پیلے ٹمبر پچر سے آخری ٹمبر پچر

تک اپنے ماس کے لحاظ سے جذب

کردہ حرارت

$$Q_p = Cm\Delta T$$

$$= Cm(T_2 - T_1)$$

$$= 2100 \times 0.5 (T_2 - 10)$$

$$= 2100 T_2 - 21000$$

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 پیلے ٹمبر پچر سے آخری

ٹمبر پچر تک جاتے ہوئے خارج کردہ

حرارت

$$Q = Cm\Delta T$$

$$= 4200 \times 0.005 (100 - T_2)$$

$$= Q = 2100 - 21 T_2$$

پانی کی جذب کردہ حرارت

بھاپ کی خارج کردہ حرارت

$$2100 T_2 - 2100 =$$

$$11300 + 2100 - 21 T_2$$

$$2100 T_2 + 21 T_2 =$$

$$11300 + 2100 + 21000$$

$$2121 T_2 = 34400$$

$$T_2 = 34400/2121$$

$$T_2 = 16.21^\circ\text{C}$$

CHAPTER # 09

$$A = 200 \text{ m}^2$$
9.1

$$L = 20 \text{ cm} = 0.2 \text{ m}$$

$$T_1 = 15^\circ\text{C} = 288 \text{ K}$$

$$T_2 = 35^\circ\text{C} = 308 \text{ K}$$

$$k = 0.65 \text{ W/mK}$$

$$Q/t = kA(T_2 - T_1)/L$$

$$= 0.65 \times 200 (308 - 288)$$

$$0.2$$

$$= 130 \times (20)/0.2$$

$$= 13000 \text{ J/s}$$

$$A = 2 \times 2.5 = 5 \text{ m}^2$$
9.2

$$L = 0.8 \text{ cm} = 0.008 \text{ m}$$

$$t = 1 \text{ hr} = 3600 \text{ s}$$

$$T_1 = 5^\circ\text{C} = 278 \text{ K}$$

$$T_2 = 25^\circ\text{C} = 298 \text{ K}$$

$$k = 0.8 \text{ W/mK}$$

$$Q = kA(T_2 - T_1)xt/L$$

$$= 0.8 \times 5 (298 - 278) \times 3600$$

$$0.008$$

$$= 4(20)3600/0.008$$

$$= 288000/0.008$$

$$= 36000000$$

$$Q = 3.6 \times 10^7 \text{ J}$$

PAKISTAN

LIVE LONG

NUMERICAL 10TH**CHAPTER # 10**

$$T = 2s \quad 10.1$$

$$g_e = 10m/s$$

$$g_m = g_e/6 = 10/6 = 1.67m/s$$

$$L = ?$$

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

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

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

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

$$L = (2)^2 \times 10/4(3.14)^2 = 10/9.8596 = 1.02m$$

$$L = (2)^2 \times 1.67/4(3.14)^2 = 1.67/9.8596 = 0.17m$$

$$L = 0.99m \quad 10.2$$

$$T = 4.9s$$

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

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

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

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

$$= 4(3.14)^2 \times 0.99/(4.9)^2 = 4(9.8596)(0.99)/24.01$$

$$g = 1.63m/s^2 \quad 10.3$$

$$L = 1m$$

$$g_e = 10m/s$$

$$g_m = 1.67m/s$$

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

$$T = 2(3.14)\sqrt{1/10} = 6.28\sqrt{0.1} = 2s$$

$$T = 2(3.14)\sqrt{1/1.6} = 6.28\sqrt{0.598} = 4.9s$$

$$T = 2s \quad 10.4$$

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

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

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

$$L = 1.02m$$

$$t = 20s \quad 10.5$$

$$\lambda = 6cm = 0.06m$$

$$f = \text{وقت / دہری کی تعداد} = n/t$$

$$f = 100/20 = 5Hz$$

$$T = 1/f$$

$$= 1/5 = 0.2s$$

$$V = f\lambda$$

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

$$f = 12Hz \quad 10.6$$

$$\lambda = 3cm = 0.03m$$

$$V = f\lambda$$

$$= 12 \times 0.03 = 0.36m/s$$

$$f = 190Hz \quad 10.7$$

$$S = 90m$$

$$t = 0.5s$$

$$(a) T = 1/f$$

$$T = 1/190 = 0.005s$$

$$(b) V = S/t$$

$$V = 90/0.5 = 180m/s$$

$$(c) \lambda = V/f$$

$$\lambda = 180/190 = 0.95m$$

$$f = 4.8Hz \quad 10.8$$

$$\lambda = 6cm = 0.06m$$

$$(a) V = f\lambda$$

$$V = 4.8 \times 0.06$$

$$= 0.29m/s$$

$$(b) T = 1/f$$

$$T = 1/4.8 = 0.21s$$

$$f = 5Hz \quad 10.9$$

$$\lambda = 40mm$$

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

$$S = 80cm = 0.8m$$

$$V = f\lambda$$

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

$$= 0.2m/s$$

$$t = S/V \quad (S=Vt)$$

$$= 0.8/0.2 = 4s$$

$$f = 90MHz \quad 10.10$$

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

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

$$\lambda = V/f$$

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

$$= 3.33m$$

CHAPTER # 11

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

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

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

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

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

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

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

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

$$= 64.771 = 64.8dB$$

$$(b) S.L = 100dB$$

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

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

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

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

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

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

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

$$S.L = 80dB \quad 11.2$$

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

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

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

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

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

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

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

$$V = 330m/s \quad 11.3$$

$$\lambda = 5cm = 0.05m$$

$$V = f\lambda$$

$$330 = f \times 0.05$$

$$f = 330/0.05$$

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

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

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

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

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

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

$$= 2618m$$

$$V = 343m/s \quad 11.8$$

$$f = 20000Hz$$

$$(a) V = f\lambda$$

$$343 = 20000 \times \lambda$$

$$\lambda = 343/20000$$

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

$$(b) V = f\lambda$$

$$343 = 20 \times \lambda$$

$$\lambda = 343/20 = 17.2m$$

$$f = 2kHz \quad 11.9$$

$$= 2000Hz$$

$$\lambda = 35cm = 0.35m$$

$$S = 1.5km = 1500m$$

$$V = f\lambda$$

$$= 2000 \times 0.35$$

$$= 700m/s$$

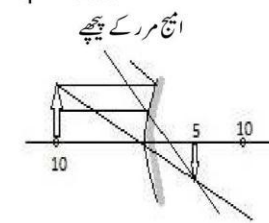
$$t = S/V \quad (S=Vt)$$

$$= 1500/700 = 2.1s$$

CHAPTER # 12

$$p = 10cm \quad 12.1$$

$$q = -5cm$$



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

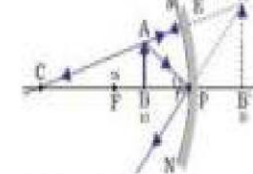
$$= 1/10 + 1/(-5)$$

$$f = -10cm \quad (div-m)$$

$$O = 30cm \quad 12.2$$

$$p = 10.5cm$$

$$f = 16cm$$



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

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

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

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

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

$$q = 30.54cm \quad (con-m)$$

$$I/O = q/p$$

$$I/30 = 30.54/10.5$$

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

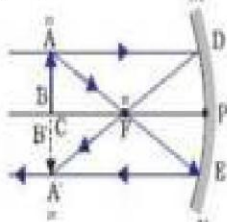
$$p = 20 \text{ cm} \quad \boxed{12.3}$$

$$l/o = q/p$$

$$l/l = q/p$$

$$1 = q/p$$

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



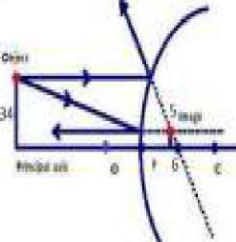
$$1/f = 1/p + 1/q$$

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

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

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

$$q = -5.66 \text{ cm (div-m)}$$



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

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

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

$$f = -194.7/28.74$$

$$= -6.77 \text{ cm (div-m)}$$

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

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



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

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

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

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

$$p = 155.25/2$$

$$= 77.62 \text{ cm}$$

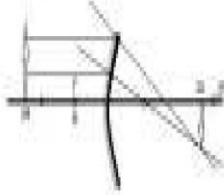
$$f = -8.70 \text{ cm} \quad \boxed{12.6}$$

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

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

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

$$= 38.4 \text{ cm}$$



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

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

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

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

$$q = 167.91/10.6$$

$$= 15.84$$

$$(b) l/o = q/p$$

$$l/13.2 = 16.84/19.3$$

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

$$(c) l/o = q/p$$

$$l/13.2 = 15.84/38.4$$

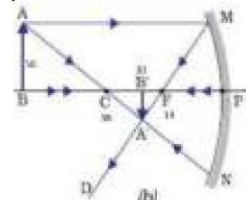
$$l = 5.42 \text{ cm}$$

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

$$f = R/2 = 38/2$$

$$= 19 \text{ cm}$$

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



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

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

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

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

$$q = 950/31$$

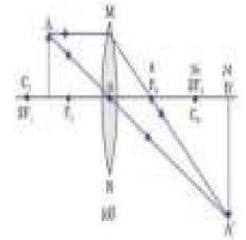
$$= 30.64 \text{ cm}$$

ایچ سیدھی ہوگی

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

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

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



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

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

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

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

$$(b) l/o = q/p$$

$$l/4 = 24/12$$

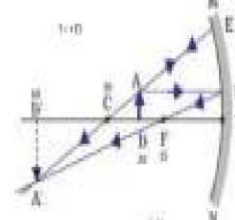
$$l = 8 \text{ cm}$$

ایچ، ریکل، الٹی، بڑی

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

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

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



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

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

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

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

$$l/o = q/p$$

$$l/10 = 8.75/20$$

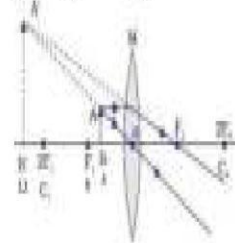
$$l = 4.28 \text{ cm}$$

ایچ، در چوئل، سیدھی، بڑی

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

$$q/p = 3/1$$

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



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

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

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

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

$$n = 1.25$$

$$(a) n = \sin i / \sin r$$

$$1.25 = \sin 35^\circ / \sin r$$

$$\sin r = 0.57/1.25$$

$$\sin r = 0.45$$

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

$$r = 27.32^\circ$$

$$(b) n = \sin i / \sin r$$

$$1.25 = \sin e / \sin 90^\circ$$

$$\sin e = \sin 90^\circ / 1.25$$

$$\sin e = 0.80$$

$$e = \sin^{-1}(0.80)$$

$$= 53.13^\circ$$

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

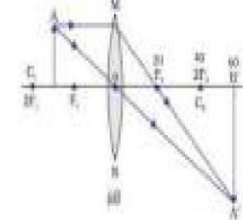
$$f = 1/P$$

$$= 1/5 = 0.2 \text{ m}$$

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

$$q/p = 2/1$$

$$q = 2p$$



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

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

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

CHAPTER # 13

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

$$= 100 \times 10^{-6} \text{ C} = 10^{-4} \text{ C}$$

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

$$n = Q/e \quad (Q = ne)$$

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

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

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

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

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

$$q_2 = 5 \mu\text{C} = 5 \times 10^{-6} \text{ C}$$

$$r = 150 \text{ cm} = 1.5 \text{ m}$$

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

$$F = kq_1q_2/r^2$$

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

$$(1.5)^2$$

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

$$F = 20 \times 10^{-2} = 0.2 \text{ N}$$

دفع کی فورس، مثبت چارجز

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

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

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

$$F = kq_1q_2/r^2$$

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

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

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

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

$$\sqrt{q^2} = \sqrt{0.888 \times (10^{-6})^2}$$

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

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

$$F = 0.1N \quad [13.4]$$

$$r = 5cm = 0.05m$$

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

$$F = kq_1q_2/r^2$$

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

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

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

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

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

Now if

$$r = 2cm = 0.02m$$

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

$$F = kq_1q_2/r^2$$

$$= \frac{9 \times 10^9 \times 2.8 \times 10^{-14}}{(0.02)^2}$$

$$= (25.2/0.0004) \times 10^{-9-14}$$

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

$$F = 0.63N$$

$$V = 10^4V \quad [13.5]$$

$$q = 100\mu C$$

$$= 100 \times 10^{-6} = 10^{-4}C$$

$$V = W/q$$

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

$$W = 10^4 \times 10^{-4} = 10^0$$

$$W = 1J$$

$$q = +2C \quad [13.6]$$

$$V_a = 100V$$

$$V_b = 50V$$

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

$$= 2(100 - 50) = 100J$$

$$V_b = 9V \quad [13.7]$$

$$Q = 0.06C$$

$$Q = CV$$

$$0.06 = 9 \times C$$

$$C = 0.06/9$$

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

$$Q_1 = 0.03C \quad [13.8]$$

$$V_1 = 6V$$

$$Q_2 = 2C$$

$$C = C$$

$$Q_1/V_1 = Q_2/V_2$$

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

$$= 2 \times 6 / 0.03 = 400V$$

$$C_1 = 6\mu C \quad [13.9]$$

$$C_2 = 12\mu C$$

$$V = 12V$$

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

$$= 1/6 + 1/12 = 4\mu C$$

$$C_{eq} = 1/4\mu C$$

$$V = 12V$$

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

$$= 1/6 + 1/12 = 4\mu C$$

$$C_{eq} = 1/4\mu C$$

$$V = 12V$$

$$C_{eq} = 1/4\mu C$$

$$V = 12V$$

$$C_{eq} = 1/4\mu C$$

$$V = 12V$$

$$C_{eq} = 1/4\mu C$$

$$V = 12V$$

$$C_{eq} = 1/4\mu C$$

$$V = 12V$$

$$C_{eq} = 1/4\mu C$$

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

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

$$V_1 = Q/C_1$$

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

$$= 8V$$

$$V_2 = Q/C_2$$

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

$$= 4V$$

$$C_1 = 6\mu C \quad [13.10]$$

$$C_2 = 12\mu C$$

$$V = 12V$$

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

$$= 6 + 12 = 18\mu F$$

$$C_{eq} = 18\mu F$$

$$C_{eq} = 18\mu F$$

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$$C_{eq} = 18\mu F$$

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

$$= 0.01mA$$

$$V = 10V \quad [14.3]$$

$$I = 1.5A$$

$$t = 2mint = 120s$$

$$R = V/I = 10/1.5$$

$$= 6.667\Omega$$

$$W = I^2Rt$$

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

$$W = 1800J$$

$$R_1 = 2k\Omega \quad [14.4]$$

$$R_2 = 8k\Omega$$

$$V = 10V$$

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

$$= 2 + 8 = 10k\Omega$$

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

$$= 2 + 8 = 10k\Omega$$

$$R_e = 10k\Omega$$

$$R_e = 10k\Omega$$

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$$R_e = 10k\Omega$$

$$E = PxHours/1000$$

$$= 100 \times 150 / 1000$$

$$= 15kWh$$

$$P = 150W \quad [14.7]$$

$$R = 95\Omega$$

$$P = VI = V(V/R)$$

$$P = V^2/R$$

$$150 = V^2/95$$

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

$$V^2 = 14250$$

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

$$V = 120V$$

$$V = 120V$$

$$V = 120V$$

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

ہیئر کے کرنٹ، رزسٹنس

$$P = 4kW = 4000W$$

$$V = 250V$$

$$(a) P = VI$$

$$4000 = 250 \times I$$

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

$$(b) V = IR$$

$$250 = 16 \times R$$

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

$$R = 5.6\Omega \quad [14.10]$$

$$V = 3V$$

$$I = 0.5A$$

$$(a) P_r = I^2 R$$

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

$$= 1.4W$$

$$(b) P_b = VI$$

$$= 3 \times 0.5$$

$$= 1.5W$$

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

CHAPTER # 15

$$V_p = 240V \quad [15.1]$$

$$V_s = 12V$$

$$N_p = 2000$$

$$N_s/N_p = V_s/V_p$$

$$N_s/2000 = 12/240$$

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

$$= 100$$

$$N_p = 1 \quad [15.2]$$

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

$$V_p = 20V$$

$$N_s/N_p = V_s/V_p$$

$$100/1 = V_s/20$$

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

$$= 2000V$$

$$N_p = 100 \quad [15.3]$$

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

$$V_p = 170V$$

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

$$N_s/N_p = V_s/V_p$$

$$1/100 = V_s/170$$

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

$$= 1.7V$$

ان پٹ پاور = آؤٹ پٹ پاور

$$V_s I_s = V_p I_p$$

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

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

$$= 0.1A$$

$$V_p = 240V \quad [15.4]$$

$$V_s = 12V$$

$$N_p = 4000$$

$$I_s = 0.4A$$

$$N_s/N_p = V_s/V_p$$

$$N_s/4000 = 12/240$$

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

$$= 200$$

ان پٹ پاور = آؤٹ پٹ پاور

$$V_s I_s = V_p I_p$$

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

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

$$= 0.02A$$

$$P = 500MW \quad [15.5]$$

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

$$V = 250kV$$

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

$$P = VI$$

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

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

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

$$P_{gen} = 150kW \quad [15.6]$$

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

$$V_{wire} = 10000V$$

$$R = 2\Omega$$

$$S = 5km = 5000m$$

تار میں پاور ہیز 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

$$P_{loss} = V_d I_w$$

$$= 30 \times 15 = 450W$$

شیر کے ٹرانسمارمر کو تار سے جو

وولٹیج ملا

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

$$= 10000 - 30$$

$$= 9970V$$

CHAPTER # 18

$$T_{1/2} = 7.3s \quad [18.1]$$

$$T_p = 29.2s$$

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

$$29.2 = n \times 7.3$$

$$n = 29.2/7.3 = 4$$

$$N = N_0/2^n$$

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

سولہ واں حصہ باقی رہ جائے گا

$$T_{1/2} = 5.25Y \quad [18.2]$$

$$T_p = 26Y$$

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

$$26 = n \times 5.25$$

$$n = 26/5.25 = 5$$

$$N = N_0/2^n$$

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

بیس واں حصہ باقی رہ جائے گا

$$T_{1/2} = 5730Y \quad [18.3]$$

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

$$= 3 \times 5730$$

$$= 17190$$

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

$$T_{1/2} = 6h \quad [18.4]$$

$$T_p = 36h$$

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

$$36 = n \times 6$$

$$n = 36/6 = 6$$

$$N = N_0/2^n$$

$$= 200/2^6$$

$$= 200/64$$

$$= 3.12mg$$

$$T_{1/2} = 10mint \quad [18.5]$$

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

$$= 3 \times 10$$

$$= 40mint$$

$$N = N_0/2^n$$

$$= 23c/m$$

$$N = N_0/2^n$$

$$23 = 368/2^n$$

$$2^n = 368/23$$

$$2^n = 16$$

$$2^n = 2^4$$

$$n = 4$$

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

$$= 4 \times 10$$

$$= 40mint$$

دو ہاف لائف کے بعد

$$T_p = 4mint \quad [18.6]$$

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

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

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

$$T_{1/2} = 1500Y \quad [18.7]$$

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

$$= 32000c/m$$

$$N = N_0/2^n$$

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

$$16 = 2^n$$

$$2^4 = 2^n$$

$$n = 4$$

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

$$= 4 \times 1500$$

$$= 6000Y$$

$$T_{1/2} = 4000Y \quad [18.8]$$

$$t = 8h$$

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

$$270, 312, 305, 290$$

کاؤنٹ ریٹ میں بے ترتیبی ظاہر کرتی ہے

کہ اس کی ہاف لائف چار ہزار

بہت زیادہ ہے اور مشاہدہ کا نام آٹھ

گھنٹے بہت کم ہے

$$T_{1/2} = 6h \quad [18.4]$$

$$T_p = 36h$$

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

$$36 = n \times 6$$

$$n = 36/6 = 6$$

$$N = N_0/2^n$$

$$= 200/2^6$$

$$= 200/64$$

$$= 3.12mg$$

$$T_{1/2} = 10mint \quad [18.5]$$

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

$$= 3 \times 10$$

$$= 40mint$$

$$N = N_0/2^n$$

$$= 23c/m$$

$$N = N_0/2^n$$

$$23 = 368/2^n$$

$$2^n = 368/23$$

$$2^n = 16$$

$$2^n = 2^4$$

$$n = 4$$

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

$$= 4 \times 10$$

$$= 40mint$$

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