ERRATA –CORRIGE del libro

PROBLEMI DI FISICA GENERALE - Elettromagnetismo e Ottica

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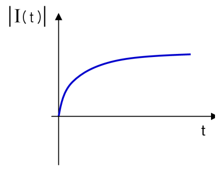
Prob.	Pag.	Riga	CORREZIONE
1.1	6	14	$x=\left(\frac{(2.4\times10^{-8})\times0.2}{2\pi\times8.85\times10^{-12}\times10^{\boxed{-2}}\times9.8}\right)^{1/3}=(2.11\times10^{\boxed{-5}})^{1/3}=\boxed{2.77}\times10^{-2}\,m$
1.2	7	9	$q^2-5\times10^{-5}q+\boxed{0.444}\times10^{-9}=0$
1.5	12	7	$=9\times10^9\times\frac{2\times10^{-6}\times(-1)}{10^{3/2}}=\boxed{-}\,0.57\times10^3V/m$
1.5	12	15	$E(P)=...=\sqrt{(\boxed{-}0.57)^2+(-1.92)^2+(3.6)^2}=...$
1.6	14	11	$\lvert\vec{R}\rvert=...=\sqrt{49.7+36\boxed{\times10^{-6}}}=...$
1.7	15	11	$E(P_3)=\frac{\sigma}{\boxed{2}\,\varepsilon_0}-...=\boxed{-}\,\frac{2\times4.43\times10^{-8}}{8.85\times10^{-12}}\cong\boxed{-}\,10^4V/m$
1.7	15	15	$E(P_3)=\boxed{-}\,10^4V/m$
1.8	16	8	$dq=\boxed{\lambda}\,ds=\boxed{\lambda}\,Rd\theta$
1.9	18	4	“ … risultante $\boxed{\text{in}}$ P …”
1.9	18	24	$E_x(P)=...=\frac{\boxed{kq}}{d(l+d)}=...$
1.9	18	25	$E(P)=...=\sqrt{2}\,\frac{\boxed{kq}}{d(l+d)}=\boxed{42.4}\,V/m$
1.12	22	8	$Q=...=\boxed{\frac{4}{5}}\pi\alpha R^{\boxed{5}}$
1.13	23	1	“ $\boxed{\text{Dentro}}$ una sfera di raggio …”
1.16	27	1	“ Nel $\boxed{\text{volume}}$ di una sfera $\boxed{\text{isolante}}$ …”
1.17	28	13,14	$D(2R_0)=...=8.33\times10^{-3}C/m^{\boxed{2}}$
1.18	29	1	“… esiste un campo $\boxed{\text{non}}$ uniforme …”
1.20	32	8	“ … della sfera $\boxed{\text{interna}}$ che è metallica …”
1.20	32	16	“ … della sfera $\boxed{\text{cava}}$ metallica, per cui …”
1.20	32	22	$V_0=\boxed{V(R)}=\frac{q}{4\pi\varepsilon_0R}\boxed{+\text{cost.}}$
1.21	33	3	“ … essendo $\boxed{\rho_0}$, a, b costanti ...”
1.21	33	11, 12	“ … da scegliere è quella di un $\boxed{\text{cilindro}}$ di raggio r e di lunghezza L coassiale al cilindro stesso. $\boxed{\text{L'elemento di volume del secondo integrale è quello di un mantello cilindrico di raggio } r\text{, lunghezza } L \text{ e spessore } dr\text{:} \quad dV = 2\pi rLdr}$ ”
1.22	36	9	$Q_{\text{int}}=\rho_0\int_0^R(\boxed{3r+4r^2})\times2\pi\ell\times rdr$
1.23	37	21	$E_2=\boxed{125}\,N/C$
1.24	39	6	$...=\frac{4/3\,\pi R_{\boxed{2}}^3\,\rho}{4\pi\varepsilon_0(r-a)}=...$
1.27	43	10	“ … (vedi figura). $\boxed{\text{Per}}$ poter …”
1.28	45	18	$\boxed{-}\Delta U_G-\Delta U_E=\Delta K$
1.28	46	1	$d^2y/dt^2=g-\boxed{qE/m}$
1.29	47	10	$\sigma=Q/\pi\boxed{R^2}$
1.29	47	19,20	“ … lamina e inoltre, $\boxed{\text{per un punto dell'asse del disco, si ottiene}}$: $V(d)=\frac{\sigma}{2\varepsilon_0}\left[\sqrt{R^2+d^2}-d\right]\approx\frac{\sigma R}{2\varepsilon_0}-\frac{\sigma d}{2\varepsilon_0}=V_0-\frac{V_0d}{R}$.”
1.29	47	21	“… la carica q sarà $\boxed{L=qV_0d/R}$ e poiché …”
1.29	47	24	$K\equiv E_C=\frac{1}{2}mv_d^2=L=\boxed{\frac{qV_0d}{R}}\quad\rightarrow\quad v_d=\sqrt{\boxed{\frac{2qV_0d}{mR}}}$
1.31	50	11	$E_{C,\max}=U_{\max}=\frac{1}{2}\boxed{k}\,x_0^2$ con $\boxed{k}=\omega^2m$
1.32	52	14	$\boxed{\langle P\rangle=\frac{\mu_0\omega^4}{12\pi c}q^2d_0^2}$
1.33	54	4	$Q=\int_\tau\boxed{\rho}\,dV=...$
1.33	54	5	$Q=...=\pi\times10^{-7}R^{\boxed{4}}=...$

1.36	58	2	$V=(3x+y^2/x-3\boxed{yz})+35$
1.37	60	1	"… nel volume cilindrico $\boxed{V}$…"
1.37	60	4	"… ed essendo $\boxed{E^2}$ a simmetria cilindrica, …"
1.39	62	17	$\Delta V=...=-\frac{\boxed{K}}{4\varepsilon_0}\int_{r_A}^{r_B}r^2dr=-\frac{\boxed{K}}{4\varepsilon_0}\left(\frac{r_B^3}{3}-\frac{r_A^3}{3}\right)$
1.39	62	19	$\Delta V=V_B-V_A=-\frac{\boxed{2}\times10^{-3}}{35.44\times10^{-12}}\times\boxed{168}\times10^{-9}=-\boxed{9.48}V$
1.40	64	5	$\vec{E}=...=(18.15\hat{\imath}+10.57\hat{\jmath})\boxed{\times10^3}V/m$
1.40	64	7	$E=...=\sqrt{(18.15)^2+(10.57)^2}\ \boxed{\times10^3}=...$
1.42	66	7	$dq=\lambda\boxed{dx}=bx\,dx$
1.42	66	8	$dV=...=\boxed{k_0}b\frac{xdx}{(d+x)}$
1.43	67	15	"E_r va $\boxed{\text{determinato}}$ applicando …"
1.46	72	9	$dV=k_0\frac{dq}{\boxed{R}}=k_0\frac{2\pi\boxed{\sigma}rdr}{\sqrt{r^2+x^2}}$
1.46	72	14	$E(P)=-\frac{\partial V}{\partial x}=-2\pi k_0\sigma\left[\frac{\boxed{x}}{\sqrt{x^2+b^2}}-\frac{\boxed{x}}{\sqrt{x^2+a^2}}\right]=\frac{x\sigma}{\boxed{2}\varepsilon_0}\left[\frac{1}{\sqrt{x^2+b^2}}-\frac{1}{\sqrt{x^2+a^2}}\right]$
1.49	77	1	$W_E(r<R)=\int_\tau w\,d\tau=\int_0^R\frac{\varepsilon}{2}\left(\boxed{\frac{Qr}{4\pi\varepsilon R^3}}\right)^2\times4\pi r^2dr=$
1.51	79	19	$V(3)=\frac{k_0Q}{\boxed{\sqrt{R^2+x^2}}}=...$
1.51	79	20	$W_{AB}=\boxed{q}[V(0)-V(3)]\approx...$
1.52	80	8	$\boxed{4\pi r^2E}=\frac{1}{\varepsilon_0}\int_0^r\rho d\tau=\frac{1}{\varepsilon_0}\int_0^r\frac{\alpha}{r^2}\times4\pi r^{\boxed{2}}dr\to...$
1.52	80	9	$\boxed{4\pi r^2E}=\frac{1}{\varepsilon_0}\int_0^R\rho d\tau=\frac{1}{\varepsilon_0}\int_0^R\frac{\alpha}{r^2}\times4\pi r^{\boxed{2}}dr\to...$
1.54	82	3	"... della sfera. Se $\boxed{\text{mediante un lungo filo conduttore}}$ la sfera viene collegata con un'altra sfera metallica scarica $\boxed{\text{molto lontana}}$ di volume τ_2 pari ad 1/8 di τ_1, determinare…"
1.55	84	20	$\to\frac{Q^2}{8\pi\varepsilon_0}\left(\frac{1}{a}-\frac{1}{r}-\frac{\boxed{f}}{2a}\right)=0$
1.55	84	22	$\boxed{r}=\frac{2a}{2-f}$
1.57	87	15	$E(d/2)=...=\frac{218\times10^{-10}}{55.6\times10^{\boxed{-12}}\times10^{-3}}=...$
1.59	89	10	"… i condensatori avranno $\boxed{\text{carica totale}}$ Q', e poiché …"
1.60	91	11	$Q^*_\beta=\boxed{C^*_\beta\times V_{AC}}=C_x\times V_1$
1.60	91	13, 14	sostituire $\boldsymbol{C}$ con $\boldsymbol{C_x}$
1.61	92	3	"… di rigidità dielettrica $\boxed{\boldsymbol{E_R}}$."
1.62	94	2-6	"… $\boxed{\text{del sistema sarà uguale al lavoro meccanico effettuato sul sistema } (-L) \text{ più il lavoro elettrico compiuto dal generatore } (L_G) \text{ per mantenere costante la differenza di potenziale. Quindi } -L+L_G=-\Delta W=W_{E1}-W_{E2}\text{ ; …}}$"
1.62	94	12	$\boxed{-L+L_G}=W_{E1}-W_{E2}=...$
1.62	94	14	$\boxed{-L+L_G}=\frac{\varepsilon_0SV^2}{2}\left(\frac{1}{x_1}-\frac{1}{x_2}\right)$
1.62	94	15	"$\boxed{\text{ma } S=\frac{C_1x_1}{\varepsilon_0}=\frac{Q_1}{V}\frac{x_1}{\varepsilon_0},\ \text{ ed inoltre }\ L_G=\int Vdq=\int V^2dC=2\times\frac{\varepsilon_0SV^2}{2}\left(\frac{1}{x_1}-\frac{1}{x_2}\right)}$ $\boxed{\text{per cui in definitiva si ottiene}}$:"
1.63	95	13, 14	$C_{tot}=\boxed{8.85}\times10^{-12}\times\ ...\ =\boxed{19.45}\ pF$
1.63	96	8	$E_{\boxed{1}}=...$
1.67	100	20	$\lvert\vec{E}_0\rvert=...=\boxed{k_0}\frac{q}{r^2}$
1.67	101	4	$\lvert\vec{E}\rvert=...=\boxed{k_0}\frac{q}{\varepsilon_r r^2}$
1.67	101	15	$\lvert\vec{E}_0\rvert=\frac{\boxed{k_0}q}{r^2},\quad\lvert\vec{D}_0\rvert=\varepsilon_0\frac{\boxed{k_0}q}{r^2},\quad\lvert\vec{P}\rvert=0$
2.4	107	15	$P=...=j^2\rho\times(S\boxed{L})=...$
2.5	108	6	$(\boxed{\rho_{acc}=2.0\times10^{-7}\,\Omega m},\ \boxed{\rho_{cu}=1.77\times10^{-8}\,\Omega m})$

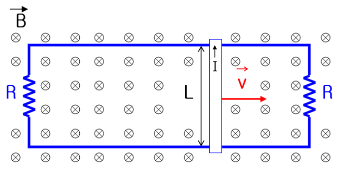
2.5	108	ultima	$\frac{I_{Cu}}{I} = \frac{R_{\boxed{acc}}}{R_{\boxed{Cu}} + R_{\boxed{acc}}} = \frac{\boxed{0.637}}{\boxed{0.637+0.141}} \approx 0.82$
2.10	113	20	$\boxed{I_2 = 0.757\,A}$
2.13	117	1	"… di resistenza $\boxed{\text{interna}}$ trascurabile …"
2.17	122	2,3	"… collegati tra loro $\boxed{\text{come in figura}}$ e tale combinazione …"
2.18	125	20,21	$P=(5.726+\boxed{1.275}+\boxed{6.833})=\boxed{13.834}\,W$ $\quad P=\boxed{13.83}\,W$
2.20	127	6	"… alla massima *d.d.p* $\boxed{V_{max}}$ che …"
2.21	129	3	$20I_{\boxed{1}}+30I_3=-10$
2.31	143	2	"… posti in parallelo tra $\boxed{D \text{ ed } E}$ saranno …"
2.38	152	23	$W_E = ... = \frac{1}{2}\times\frac{2\pi\varepsilon_0\varepsilon_r L}{\ln(r_2/r_1)}\times\left[\frac{\alpha V_0(r_2-r_1)}{2\pi L R_0 r_1 r_2+\alpha(r_2-r_1)}\right]^{\boxed{2}}$
2.40	154	15	$V' = Q_0/\boxed{C'_{tot}} = 144V$
2.47	163	18,19	$T=...=(R_A+2R_B)\boxed{C}\times\ln 2$ $\quad T=(R_A+2R_B)\boxed{C}\times\ln 2$
3.1	166	1	"… di raggio $\boxed{R = a}$ e con i loro assi distanti $\boxed{d}$ …"
3.1	166, 167		sostituire ***D*** con ***d*** dove necessario
3.6	173	15	$B_0(P_2)=\frac{\mu_0 I}{\pi r}-\frac{\mu_0 I r}{2\pi(r^2\boxed{+}a^2/4)}$
3.12	180	10	$2\pi r B(r)=\mu_0 I\frac{r^{\boxed{2}}}{R^2}$
3.14	182	19	$I=...=\boxed{4\pi(b-a)}$
3.14	183	8	$2\pi r_{\boxed{1}}B(r_1)=...$
3.19	189	10	$=\int_0^\theta B\boxed{r}\,d\theta = B\boxed{r}\theta$
3.19	189	13, 14	$I_{conc}=jS=\frac{I}{\pi\boxed{a^2}}\times\frac{\boxed{a}}{2}\times\boxed{a}\theta=\frac{I\theta}{2\pi}=3.5\times\frac{\pi/4}{2\pi}A$
3.30	202	9	$3\pi\times10^{-6}\boxed{T}$
3.32	204	20	$\boxed{5.84}\times10^{-4}T$
3.32	205	3	$\varphi_1=-\arctan\frac{L-X}{\boxed{R}}=...$
3.33	206	20, 22	$B(P_2)=\frac{\mu_0 i}{\boxed{2}d}[...]$
3.34	207	16	"…si ottiene $\boxed{\varphi_1=-\varphi_2}$ e si ha …"
3.36	209	21	$R_d=...=\frac{2}{eB}\sqrt{\boxed{m_p}K}$
3.39	213	14	$v=...=\sqrt{\frac{10^{-20}\times10^{-2}}{\boxed{1.67}\times10^{-27}}}=\boxed{10^2}\sqrt{6}=\boxed{2.45\times10^2}\,m/s$
3.39	213	16, 17	$\mu=\frac{1.6\times10^{-19}\times\boxed{2.45\times10^2}\times10^{-2}}{2}\cong 2\times10^{\boxed{-19}}Am^2$ $\quad \mu\cong2\times10^{\boxed{-19}}Am^2$
3.41	215	ultima	$\vec F=\boxed{e}\vec v\times\vec B_0=0$
3.42	216	2	$\vec B=0.25\hat i+0.4\hat j+0.5\hat k\ \boxed{T}$
3.43	217	17	$K_f=20.6MeV=2N\boxed{q}V$
3.43	217	18, 19	$N=\frac{K_f}{2\boxed{q}V}=\frac{20.6\times10^6\boxed{eV}}{2\times500\,eV}=\boxed{2.06}\times10^4$ $\quad N=\boxed{2.06}\times10^4$ rivoluzioni
3.44	218	3	$\boxed{E}=1000V/m$
3.50	226	6, 7	$\Delta t=...=\boxed{39.25}\times10^{-6}s$ $\quad \Delta t=\boxed{39.25}\,\mu s$
3.52	228	4	"… di $\boxed{\mathbf{24}\ \mu V}$. Determinare …"
3.54	231	16	$\tan\alpha_2=...=\boxed{0.617}$
3.55	232	3	"… magnetizzazione $\boxed{M = 1.8\times10^6\ Asp/m}$."
3.55	232	7	$H=\boxed{\frac{B}{\mu_0}-M}=\frac{2.30}{4\pi\times10^{-7}}-1.8\times10^6\approx30\times10^3 Asp/m$
3.56	233	13	$\vec M=\frac{\boxed{\vec\mu}}{V}=...$
3.57	234	20	$\Phi(\vec B)=NI\times\boxed{\frac{1}{\sum\Re_i}}=10^2\times10^{-1}\times\left(\boxed{\frac{1}{0.375\times10^6+4\times10^6}}\right)=\boxed{2.29\times10^{-6}}\,wb$
4.1	240	15, 16	$W=...=\int_0^2\frac{\boxed{17.64}t^4-13.44t^3+2.56t^2}{1.5}dt=\boxed{11.76}\int_0^2 t^4dt-...$

4.1	240	17	$W=\boxed{11.76}\times\frac{32}{5}\boxed{-}8.96\times\frac{16}{4}+1.71\times\frac{8}{3}=\boxed{44.2}\,J$
4.3	242	3	"… di raggio $\boxed{R = 5\ cm}$."
4.3	242	16	$E=\ldots=0.18\times\boxed{10^{-2}}\,V/m=\ldots$
4.4	244	7	$i_1=\boxed{37.2}\,mA;\quad i_2=\boxed{184.6}\,mA;\quad i_3=\boxed{147.4}\,mA$
4.4	244	13, 14	$\Delta V(R_2)=\ldots=\boxed{0.738}-0.598=\boxed{0.140}\,V$
4.7	247	22	$I_{max}=-\frac{2B}{R}v_y\tan 30^\circ L\boxed{\cos 30^\circ}=\ldots$
4.8	248	1	"… di superficie 480 $\boxed{cm^2}$ …"
4.10	250	24	$V_{\boxed{D}}-V_{\boxed{A}}=\ldots$
4.12	252	ultima	$\tau_{max}=I_{max}S\boxed{B}N=\ldots$
4.13	254	ultima	$i(t)=\ldots=\frac{\boxed{0.96}}{t^3}\times10^{\boxed{-6}}A$
4.14	255	1	"… filo di rame $\boxed{(\rho_{Cu}\approx 1.8\times10^{-8}\ \Omega m)}$ …"
4.19	260	19	$B=\mu_0\boxed{I(t)}/2\pi r$
4.20	261	18	$B_i=\frac{\mu_0 I_i}{2\boxed{R_1}}=\ldots$
4.21	262	22	$\ldots=-\frac{\pi\mu_0\boxed{r_0^2}n}{2R}\frac{dI}{dt}=\ldots$
4.22	263	9	$B(t)=\frac{\mu_0}{2\pi}\frac{\boxed{I_0}}{r}\sin\omega t$
4.22	263	19	$\ldots=N\frac{\mu_0}{2\pi}I_0 l\ \ln\left(\frac{d+l}{\boxed{d}}\right)\sin\omega t$
4.22	263	20	$E_i=-\frac{\partial\Phi(\vec B)}{\partial t}=-N\frac{\mu_0}{2\pi}I_0 l\ \ln\left(\frac{d+l}{\boxed{d}}\right)\omega\cos\omega t$
4.22	263	21	$E_i=-10\times4\pi\times10^{-7}\times\boxed{1\times\ln5\times50}\times\cos\omega t=-\boxed{1.01\times10^{-3}}\cos\omega t\ [V]$
4.22	263	24	$\wp=\ldots\approx\frac{\boxed{1.02}\times10^{-6}}{2\times\sqrt{4+10^5\times10^{-4}}}\approx1.37\times10^{\boxed{-7}}W$
4.23	264	20	$A_d=\ldots=\frac{4\pi^{\boxed{2}}\times10^{-7}\times10^{-6}\times(0.5)^3\times3\times10^{-9}}{2\times\left[10^{-4}+(0.5)^2\right]^{3/2}}=\ldots$
4.23	265	6	$\tau=L/R=10^{-6}\boxed{H}/0.9\Omega=1.1\times10^{-6}s$
4.24	266	2	"… di raggio $\boxed{r = 0.4\ cm << R}$ …"
4.25	267	figura 2	***modificare*** come qui indicato
4.26	268	ultima	$Q=\ldots=\frac{0.44\times10^{-7}}{2}\int_0^\infty e^{\boxed{-}t/\tau}dt=\ldots$
4.27	269	16	$\Phi(B)=\int_{do}^{do+L}\ldots=\frac{\mu_0}{2\pi}LI_0\ln\left(1+\frac{\boxed{L}}{d_0}\right)\cos\omega t$
4.27	269	17	$\frac{\mu_0}{2\pi}LI_0\omega\ln\left(1+\frac{\boxed{L}}{d_0}\right)\sin\omega t$
4.28	270	3	"… Se $\boxed{\text{ogni spira}}$ della bobina presenta una resistenza $\boxed{R_{sp}=0.5\ \Omega,}$ calcolare…"
4.28	270	14	$\ldots=3.14\times10^{\boxed{-3}}\times I_i$
4.28	270	16	$I_i=E_i/\boxed{NR_{sp}}=-\frac{1}{\boxed{NR_{sp}}}\frac{\Delta\Phi}{\Delta t}=\frac{1}{\boxed{NR_{sp}}}\boxed{N}\pi r^2\frac{\Delta B_0}{\Delta t}=\frac{1}{R_{sp}}\pi r^2\mu_0 n\frac{\Delta I_s}{\Delta t}$
4.28	270	17	$I_i=\frac{\boxed{\pi}\times10^{-4}\times4\pi\times10^{\boxed{-7}}\times2000\times(60-20)\times10^{-3}}{\boxed{0.5}\times2\times10^{-5}}\approx3.2\times10^{-3}A$
4.28	270	19	$B_i=\pi\times10^{\boxed{-3}}\times3.2\times10^{-3}=\ldots$
4.30	272	16	$RQ=\mu_0 I_{S\boxed{(in)}}N_bS_bN_S/L$
4.31	273	3	" … $I(t)=I_0\sin\omega t$ …"
4.31	273	18	$2\pi rE=\ldots=-\pi r^2\boxed{\mu_0 n}I_0\omega\cos\omega t$
4.31	273	ultima	$I(t)=\frac{\mu_0 nI_0\omega h\sigma\boxed{\cos\omega t}}{2}\int_0^a rdr$
4.35	277	2, 3	"… di raggio medio $\boxed{b}$, formato da N spire circolari di raggio $\boxed{a << b}$."
4.37	279	1	" Attorno ad un nucleo di $\boxed{\text{titanio } (\mu_r\approx1)}$ di sezione …"
4.37	279	8	" … nucleo di $\boxed{\text{titanio}}$ vale: "
4.40	283	18	$I=I_0-I_i=\boxed{\frac{V}{R}-\frac{BL}{R}\frac{dy}{dt}}$



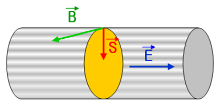
Cap. 4 – Prob. 25

4.41	284	figura	***modificare*** come qui indicato
4.42	285	3	"… di massa $\boxed{m}$ = 40 g."
4.42	285	ultima	$v=\frac{mg\boxed{R}}{B^2L^2}\frac{\tan\theta}{\cos\theta}=\dots$
4.43	287	1	$ma = T - F_m = Mg - Ma - \frac{B^{\boxed{2}}L^{\boxed{2}}}{R}v \to (M+m)\frac{dv}{dt} = Mg - \frac{B^{\boxed{2}}L^{\boxed{2}}}{R}v$
4.44	288	13	$W_G = \dots = \frac{V^2}{R}\int_0^2 \left[1-\exp\left(-\frac{R}{L}t\right)\right]\boxed{dt}$
4.44	288	ultima	$W_J = \dots = \frac{V^2}{R}\int_0^2 (\boxed{1} + e^{-2t/\tau} - 2e^{-t/\tau})dt$
4.44	289	1	$W_J = \frac{V^2}{R}\left\{\left[\boxed{t}\right]_0^2 - \dots\right\}$
4.46	291	8	$V\boxed{-}L\frac{dI}{dt} = RI$
4.46	291	18	$\dots = 10^3\left\{\left[\boxed{t}\right]_0^{0.1} + 0.2\left[e^{-5t}\right]_0^{0.1}\right\}$
4.47	292	18	$W_j = \dots = \frac{I_0^2 L}{2}\left[\boxed{-}e^{-\frac{2Ri}{L}\boxed{t}}\right]_0^{0.2} = \dots$
4.48	293	21	$R_{tot} = R_1 + \frac{\boxed{R_3}R_2}{\boxed{R_3}+R_2} = \dots$
4.49	294	15, 19-22	sostituire $L\frac{dI_1}{dt}$ con $L\frac{d\boxed{I_L}}{dt}$
4.49	295	2	sostituire $L\frac{dI_1}{dt}$ con $L\frac{d\boxed{I_L}}{dt}$
4.54	300	ultima	$j_d = -\frac{26.52\times 10^{\boxed{-2}}}{(5+3t)^2}\ A/m^2$
4.59	305	15	$I_d = C\frac{\partial V(t)}{\partial t} = CV_{max}\omega\boxed{\cos\omega t}$
4.60	306	13	$I_d = \dots = \boxed{2}C\frac{d(1-e^{-t/4})}{dt} = \dots$
4.62	308	2	"… di costante dielettrica $\boxed{\varepsilon}$ e conducibilità …"
4.62	308	20	$I_c(t) = dQ(t)/dt = \boxed{-}\frac{\sigma}{\varepsilon}Q(t)$
5.3	316	18	$\to f = \frac{1}{2\pi}\times\frac{1}{\sqrt{LC}} = 0.159\times\boxed{1.26}\times 10^7 = 2\ MHz$
5.4	317	2	"… a una frequenza $\boxed{f = f_0}$, le sue …"
5.5	318	14	$k_{1,2} = \left[\frac{-R\pm\sqrt{R^2-4L/C}}{\boxed{2L}}\right]$
5.6	319	13	$k_{1,2} = -\frac{R}{2L}\pm\frac{i}{\boxed{2L}}\sqrt{\frac{4L}{C}-R^2}$
5.6	319	17	$\omega = \sqrt{\frac{1}{LC}-\frac{R^2}{4\boxed{L^2}}} = \dots$
5.7	320	1	"… calcolare il $\boxed{\text{valore di C}}$ per cui …"
5.10	323	15	$V_R = I\,R$ e $V_L = I\omega L$
5.11	324	14	$P = \dots = \boxed{22.5}\ W$
5.11	324	18	$C = \dots \approx \boxed{3.14}\ \mu F$
5.12	325	13	$\to \omega^2 \approx 10^5 s^{\boxed{-2}}$
5.13	327	9	"…poiché è $\boxed{V_{eff}/I_{eff} > V/I}$, impedenza …"
5.14	328	20	$E_0 = V_0/d = \boxed{14.10}\ V/m$
5.14	328	24	$I_{d,eff} = \dots = \boxed{V_{eff}C\omega} = \dots$
5.14	329	1	$I_{\boxed{R}}(t) = \frac{V_0}{R}\sin\omega t$
5.14	329	2	$I_{\boxed{R,eff}} = \frac{V_{eff}}{R} = \dots$
5.14	329	3	$I_{\boxed{R,eff}} = 40\ mA$
5.15	330	6	"… lo sfasamento $\boxed{\varphi}$ …"
5.17	332	13	$\frac{1}{Z} = \dots = 3.3\times\boxed{10^{-2}}\ \Omega^{-1}$
5.19	334	ultima	$Z_{tot} = Z_{\boxed{p}} + j\omega L = \dots$



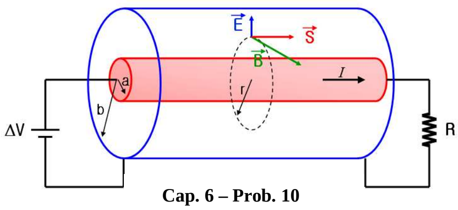
Cap. 4 – Prob. 41

5.20	337	7	$V^{\boxed{2}} = V_{RC}^2 + V_L^2 - 2V_{RC}V_L\cos\alpha$
5.20	337	17	$I_{tot,eff} = \ldots = \dfrac{100}{\boxed{1437}} = \ldots$
5.21	340	16	$\boxed{V}\omega C = \dfrac{\boxed{V}}{Z_{RL}}\sin\phi$
5.21	340	21	$I_{\min} = I_{RL}\cos\phi = \dfrac{\boxed{V}}{Z_{RL}}\cos\phi = \ldots$
5.21	340	23	"… si poteva ottenere $\boxed{\text{applicando il teorema di } Carnot}$ alla Fig. 3:"
5.21	340	ultima	$I_{\min} = \dfrac{\boxed{V}}{Z_{\max,\,tot}} = \boxed{V}\sqrt{\dfrac{1}{Z_{RL}^2} + \dfrac{1}{Z_C^2} - \dfrac{2}{Z_{RL}Z_C}\cos\left(\boxed{\dfrac{\pi}{2} - \varphi}\right)} \approx 0.18\ A$
5.22	341	7	$I = I_R = I_{LC} = I_L - I_{\boxed{C}}$
5.24	344	9	$\vec{Z}_{usc} = \hat{j}\omega\dfrac{L_2}{1 - \boxed{\omega^2}L_2C}$
5.26	347	10	$\dfrac{1}{Z_{tot}} = \sqrt{\dfrac{1}{Z_1^{\boxed{2}}} + \dfrac{1}{Z_2^{\boxed{2}}} + \dfrac{2}{Z_1Z_2}\cos(\varphi_1 - \varphi_2)}$
5.26	348	4	$Z_{\boxed{2}} = \ldots = \boxed{\left\lvert L\omega - \dfrac{1}{\omega C_2}\right\rvert} \approx \boxed{\left\lvert 3\times 314 - \dfrac{10^6}{314}\right\rvert} \approx 2200\,\Omega$
5.27	350	5	"… rispettivamente $\boxed{\phi_1 = 60°}$ e $\boxed{\phi_2 = 30°}$."
5.27	351	5	$I_{tot} = \boxed{V}\sqrt{\dfrac{1}{Z_1^2} + \dfrac{1}{Z_2^2} + \dfrac{2}{Z_1Z_2}\cos(\varphi_1 - \varphi_2)} = \ldots$
6.2	357	12	$\dfrac{\partial E_y}{\boxed{\partial x}} = -\dfrac{\partial B_z}{\partial t} = \ldots$
6.3	358	17	$1 = E_0\sin\left[\boxed{6.28}\times 10^{\boxed{6}}\times\left(10^{-4} - \dfrac{3.8\times 10^3}{10^8}\right)\right] = \ldots$
6.3	358	18	$E_0 = \ldots = \boxed{-6.38}\ V/m \ \rightarrow\ B_0 = \dfrac{E_0}{v} = \boxed{-6.38}\times 10^{-8}T$
6.3	358	20	$\vec{E} = \boxed{-6.38}\sin 2\pi\left(\dfrac{t}{T} - \dfrac{z}{\lambda}\right)\hat{j} = \boxed{-6.38}\sin 2\pi(10^6t - 10^{-2}z)V/m\ \hat{j}$
6.3	358	21	$\vec{B} = \boxed{-6.38}\times 10^{-8}\sin 2\pi(10^6t - 10^{-2}z)T\ \hat{i}$
6.4	359	16	$\mu_r = \ldots = \boxed{1.0016}$
6.6	362	3	$E = \ldots. = \dfrac{RI}{\boxed{L}}$
6.7	363	figura	***modificare*** come qui indicato



Cap. 6 – Prob. 7

6.8	364	2	$\vec{S} = -\left\{\left(440\dfrac{W}{m^2}\right)\cos^2[\ldots]\right\}\hat{k}$
6.8	365	2	"… nostra onda è pari a $\boxed{\tfrac{1}{2}\times\mathbf{440}}$ W/m^2, …"
6.8	365	7	$\vec{S} = \dfrac{\vec{E}\times\vec{B}}{\boxed{\mu_0}}$
6.10	367	figura	***modificare*** come qui indicato

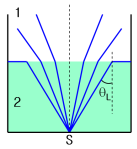


Cap. 6 – Prob. 10

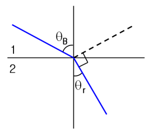
6.13	371	9	quindi $\boxed{S} = \pi R^2 = \ldots$
6.14	373	3	"… è la forza esercitata $\boxed{\text{sulla superficie}}$:"
6.15	374	18	$F = \dfrac{2\boxed{S_m}}{c}A = \ldots$
6.18	377	13	$F = ma = \dfrac{\boxed{P}}{c} = \ldots$
6.20	379	3, 4	"… da una sorgente $\boxed{\text{emettitrice}}$. L'ampiezza …"
6.20	379	22	"… moltiplicata per $\boxed{\text{l'area}}$ della $\boxed{\text{calotta}}$:"
6.23	382	20	"… quindi che $\boxed{\text{il granello}}$ abbia un raggio:"
6.25	384	3	"… onda *e.m.* è $\boxed{\boldsymbol{P}}$= 3.96×10[26] W …"
6.25	384	18	$G\dfrac{M_S\times\frac{4}{3}\pi r^3\rho}{D^2} = \dfrac{\boxed{P}}{4\pi D^2}\times\dfrac{1}{c}\times\pi r^2$
6.25	384	19	$G\dfrac{M_S\times 4r\rho}{3} = \dfrac{\boxed{P}}{4\pi c} \quad\rightarrow\quad r = \dfrac{3\boxed{P}}{16\pi cGM_S\rho}$
6.26	385	6	$\cancel{M_{Terra} = 6.37\times 10^{18}\ kg}$
6.26	386	1	$F_g = 6.77\times 10^{-11}\times\dfrac{1.97\times 10^{30}\times\frac{4}{3}\pi\times(6.37)^3\times 10^{18}\times 5.5\times 10^3}{(1.5)^2\times 10^{\boxed{22}}} = \ldots$
6.27	387	6	"… esso è costituito è 0.2 $g/\boxed{cm^3}$."

6.27	387	13, 14	$B_{eff} = \ldots = \boxed{4.08}\times 10^{\boxed{-4}} T$
6.27	387	19	$h = \ldots = \frac{2}{c\rho g}\frac{\boxed{E_{eff}^2}}{Z_0} = \frac{2}{3\times10^8\times0.2\times10^3\times9.8}\times\frac{\boxed{(122.5\times10^3)^2}}{377} = \ldots$
6.28	388	17	$\Im(d) = \frac{\boxed{42.3}}{754} = \ldots$
6.29	389	18	$\Im = \ldots = \frac{1}{100}\frac{0.12\times0.5\times30}{\boxed{1}} = \ldots$
6.30	390	9	$W_{ass} = \ldots = 10^2\times10^{-4}\times1 = \boxed{10^{-2}} J$
6.30	390	15, 16	$v_{fin} = \ldots = \frac{\boxed{10^{-2}}}{5\times10^{-3}\times3\times10^8} = \boxed{0.67}\times10^{-8}\ m/s \qquad v_{fin} = 0.67\times10^{-8}\ m/s$
6.33	394	8	$\Im = \frac{\boxed{P}}{S} = \frac{50\times0.1}{4\pi\boxed{L}^2} = \ldots$
6.33	394	18	$\Delta N(10s) = \ldots = 10\times1.25\times10^{\boxed{-12}}\times\frac{5.5\times10^{-7}}{6.63\times10^{-34}\times3\times10^8} = \ldots$
6.34	395	19	$N/s = \frac{\boxed{P_{ass}}}{hf} = \frac{\boxed{P_{ass}}}{hc/\lambda} = \ldots$
7.1	398	16	$\lambda_2 = \ldots = 530\times10^{-9} + 1.56\times10^{-2}\times\frac{5\times10^{\boxed{-5}}}{3\times2} = \ldots$
7.4	401	20	$\frac{N_2}{N_1} = \frac{\boxed{\lambda}}{\lambda_2} \rightarrow \lambda_2 = \frac{N_1}{N_2}\boxed{\lambda} = \ldots$
7.4	401	21	$N_{H_2O} = N_1\frac{\boxed{\lambda}}{\boxed{\lambda_3}}$ ed essendo $\boxed{\lambda_3} = \frac{\boxed{\lambda}}{n_a}$
7.6	404	8	$\ldots = 4.26\times10^{-3}\ \boxed{m}$
7.6	404	16	$\cos\left(\boxed{\frac{\pi\times1.6\times10^{-4}}{1.24\times5.5\times10^{-7}}\Delta x}\right) = \ldots$
7.6	404	17	$\rightarrow \Delta x = \frac{1}{6\times235} = 0.7\ \boxed{mm}$
7.7	405	8	$I \propto \boxed{2E_0^2(1+\cos\Delta\varphi)} = \boxed{4E_0^2\cos^2\frac{\Delta\varphi}{2}}$
7.8	406	14	$I = I_0\cos^2\left(\frac{\pi\boxed{d}}{\lambda}\sin\theta\right) = \ldots$
7.9	407	12	"… dovrà essere $\boxed{\Delta = \lambda}$, dove Δ è la differenza di cammino $\boxed{\text{ottico}}$."
7.9	407	13	$\Delta = \boxed{n_1}\overline{OBC} - \overline{OA} = \frac{2s\boxed{n_1}}{\cos r} - \overline{OC}\sin i = \frac{2s\boxed{n_1}}{\cos r} - 2s\tan r\sin i$
7.9	407	18	$\Delta = \boxed{\frac{2sn_1}{\cos r} - \frac{2s\sin r}{\cos r}\times n_1\sin r} = \boxed{\frac{2sn_1}{\cos r}[1-\sin^2 r]} = \lambda$
7.9	407	ultima	$s = \boxed{\frac{\lambda}{2n_1\times\cos r}} = \boxed{\frac{5500\times10^{-10}}{2\times1.33\times0.927}} = \boxed{2.23}\times10^{-7}\ m$
7.10	408	13	"… cammino $\boxed{\text{ottico}}$ fra i due raggi sarà $\Delta = \boxed{n_1}\overline{OBC} - \overline{OA}$."
7.10	409	9	"Il rapporto $\boxed{\Delta/\lambda = 1.0}$ indica che l'interferenza è $\boxed{\text{distruttiva}}$."
7.13	412	21	$\lambda_i = \ldots = \frac{1.4}{m_i + 1/2}\boxed{\mu m}$
7.15	414	2	"… diaframma di $\boxed{\text{larghezza}}$ D = 1 cm …"
7.18	417	19, 20	$a = \frac{4\lambda L}{\boxed{\Delta s}} = \frac{4\times0.4\times5.87\times10^{-7}}{0.5\times10^{-3}} = 1.88\times10^{-3}\ m$
7.19	418	2	"… è largo $\boxed{2a}$ = 12 cm …"
7.25	425	18	$\Delta x_{int} \approx \boxed{L}\theta = 2\times250\times10^{-5} = 5\times10^{-3}\ m$
7.26	426	10, 11	$\theta_{\boxed{\min}} \cong \boxed{m_D}\frac{\lambda}{a} = \boxed{m_D}\frac{540\times10^{-9}}{6\times10^{-5}} = \boxed{m_D}\times0.9\times10^{-2}\ rad; \quad \boxed{m_D} = 1, 2, 3...$
7.26	426	16	$\theta_{\boxed{\max}} \cong \boxed{m_i}\frac{\lambda}{d}$, con $\boxed{m_i} = 0, 1, 2...$
7.26	426	22	"quindi, $\boxed{\text{essendo ogni massimo di interferenza largo } \lambda/d}$, otteniamo:"
7.26	426	figura	sostituire ***x*** con ***y***
7.31	432	14	$\sin\theta = 3\times\frac{5690\times10^{\boxed{-10}}}{(1/3)\times10^{-5}} = 0.512$
7.32	433	4	"… cristallo è $\boxed{i}$ = 80°24'. "
7.32	433	11	θ = 90° − $\boxed{i}$ = 9°36'

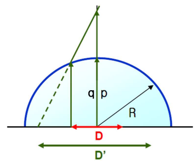
7.33	434	19	$d = \ldots = \dfrac{3\times\boxed{0.967}\times10^{-10}}{2\times0.848} = 1.71\times10^{-10}\,\boxed{m}$
7.35	436	figure	***modificare*** come qui indicato
8.4	443	2	"… con $dn/d\lambda = -4\times\boxed{10^{5}}\ m^{-1}$ …"
8.4	443	13	$n_1 = 1.52 - 4\times10^5\times(\boxed{400-550})\times10^{-9} = 1.58$
8.4	443	14	$n_2 = 1.52 - 4\times10^5\times(\boxed{700-550})\times10^{-9} = 1.46$
8.9	448	figura	***modificare*** come qui indicato
8.14	453	10	"… abbiamo $R_1 = \infty$ e $\boxed{R_2 = -R}$."
8.17	457	figura	***modificare*** come qui indicato
8.18	460	3	$\boxed{1/p + 1/q} = 1/f_2$
8.20	463	5	$\dfrac{1}{p} - \dfrac{1}{12.5\boxed{+}p} = \dfrac{1}{2.44}\,cm^{-1}$
8.20	463	17-20	"… constatiamo che, nel caso **a**), $\lvert M\rvert < 1$ (imm. rimpicciolita) per p_1, mentre invece $\lvert M\rvert > 1$ per p_2. Quest'ultima situazione descrive il funzionamento dell'*obiettivo* del microscopio. Nel caso **b**), q_1 in valore assoluto è maggiore di p_1, quindi $\lvert M\rvert > 1$. Quest'ultima situazione descrive il funzionamento dell'*oculare* del microscopio."
8.30	474	13	$1/q = 0.1 - 0.05 = 0.05\ \boxed{cm^{-1}}$
8.30	474	16	$\int_{n_0}^{n_1} dn = -5\times10^{\boxed{5}}\int_{\lambda_0}^{\lambda_1} d\lambda$
8.32	476	10	$\dfrac{1}{f} = \dfrac{1}{f_1} + \dfrac{1}{f_2}\boxed{-}\dfrac{d}{f_1 f_2}$
8.32	476	14	$\dfrac{1}{f_1} + \dfrac{1}{\lvert f_2\rvert}\left(\boxed{\dfrac{d}{f_1}-1}\right) > 0 \Rightarrow \dfrac{1}{f_1} > \dfrac{\boxed{f_1-d}}{f_1\lvert f_2\rvert} \Rightarrow \dfrac{\boxed{f_1-d}}{\lvert f_2\rvert} < 1$
8.32	476	15	$\lvert f_2\rvert > \boxed{f_1-d} \Rightarrow \lvert f_2\rvert > \boxed{0.25}\ m$
8.32	476	17	$\dfrac{1}{f_1} + \dfrac{1}{\lvert f_2\rvert}\left(\boxed{\dfrac{d}{f_1}-1}\right) < 0 \Rightarrow \dfrac{1}{f_1} < \dfrac{\boxed{f_1-d}}{f_1\lvert f_2\rvert} \Rightarrow \dfrac{\boxed{f_1-d}}{\lvert f_2\rvert} > 1$
8.32	476	18	$\lvert f_2\rvert < \boxed{f_1-d} \Rightarrow \lvert f_2\rvert < \boxed{0.25}\ m$
8.33	477	figura	***modificare*** come qui indicato
8.36	480	figura	***modificare*** come qui indicato
9.1	482	18	$f_s = \dfrac{hf_i - eV_{\boxed{a}}}{h} = \dfrac{(10.5-\boxed{4\times1.6})\times10^{-19}}{6.625\times10^{-34}} = \boxed{0.63}\times10^{15}\,Hz$
9.1	482	19	$f_s = \boxed{6.3}\times10^{14}\,Hz$
9.2	483	17	$0.81\ eV << 0.51\ \boxed{MeV}$
9.3	484	15-22	***sostituire*** $\boxed{V_0}$ con $\boxed{V_a}$
9.4	485	14	$\left(\dfrac{mv^2}{2}\right)_{\max} = \dfrac{6.63\times10^{-34}\times3\times10^8}{2\times10^{\boxed{-7}}} - (4.2\times1.6\times10^{-19}) = \ldots$
9.7	489	20	$hf_0 = \dfrac{hc}{\lambda_0} = 3.15\times10^{-19}\,\boxed{J}$
9.11	494	ultima	$\varphi = \boxed{22.88^\circ}$
9.13	496	13	$\lambda_i = 8060\ \boxed{fm}$
9.13	497	10	$v_e = \ldots = \sqrt{\dfrac{2\times9\times1.6\times10^{\boxed{-16}}}{9.1\times10^{-31}}} = \ldots$
9.16	500	11	$\dfrac{1}{\lambda_i} = \ldots = \boxed{1.014}\times10^{12}\ m^{-1}$
9.16	500	12	$\lambda_i = \boxed{0.986}\times10^{-12}\ m$
9.16	501	1	$\lambda_d = \ldots = \boxed{1.018}\times10^{-12}\ m$
9.16	501	3	$\Delta\lambda = \ldots = \boxed{0.032}\times10^{-12}\ m$
9.16	501	5, 6	$\cos\theta = \ldots = \boxed{0.9868}$ $\qquad \theta = \boxed{9.3^\circ}$
9.16	501	12	$v_e = \ldots = \boxed{1.186}\times10^8\ m/s$
9.16	501	13, 14	$\sin\varphi = \dfrac{h\sin\theta}{\boxed{\lambda_d}\,m_e v_e} = \boxed{0.974}$ $\qquad \varphi \cong \boxed{77^\circ}$
9.19	504	16	$\lambda_{\max} = \dfrac{\boxed{6.625}\times10^{\boxed{-34}}\times3\times10^8}{54.4\times1.6\times10^{-19}} = 2.28\times10^{-8}\,m$
9.20	505	10	$W_n = -\boxed{k_0^2}\dfrac{2\pi^2}{h^2}Z^2e^4m_e\dfrac{1}{n^2}$
9.24	510	16, 17	$v_{\max} = \ldots = \boxed{7.95}\times10^5\ m/s$
9.27	513	18	$\boxed{W_\gamma} = \dfrac{hc}{\lambda_\gamma} \rightarrow \lambda_\gamma = \dfrac{hc}{\boxed{W_\gamma}}$



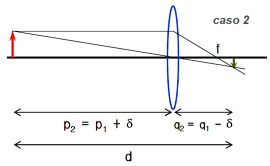
Cap. 7 – Prob. 35 (fig. 1)



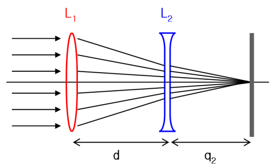
Cap. 7 – Prob. 35 (fig. 2)



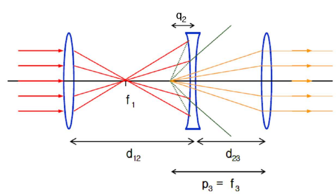
Cap. 8 – Prob. 9



Cap. 8 – Prob. 17



Cap. 8 – Prob. 33



Cap. 8 – Prob. 36