ECEN 3400, Introductory Electromagnetics, Fall 2004

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Corrections/clarifications to textbook, by chapter (posted as chapters are covered):

Chapter 2: page 26, in P2.4, "series capacitance" should read "parallel (or shunt) capacitance".

Chapter 3: page 33, line 1 below Eq.(3.8) "and the position vector, r," should read "the distance *r* from the field point, and the unit vector $\mathbf{u_r}$,"

page 38, in problem P3.6, you must assume that the charge on both bodies has the same sign (i.e. both positive or negative).

Chapter 4: page 50, Eq.(4.22) unit in parenthesis should read V/m instead of V

problem P4.1. on page 53, the solution should say that the point of zero potential is between the two charges.

Chapter 5: page 60, Eq.(5.7) has misprint in the form of a line across the last part of equation

page 61, line 2 above Questions should read "one vector unknown" instead of "one scalar unknown".

page 63, P5.7, add at the end: "where d is the thickness of the plate."

page 64, "Earnshow" should be spelled as "Earnshaw"

Chapter 6: page 80, P6.5, change "potential" to "potential with respect to a point at infinity"

Chapter 7: page 86: angle theta is between the dipole direction d and the direction u_r

page 93, add: "directed in the positive x-direction if x>x_n, and in the negative x-direction if x<0"

page 94: in paragraph at the top of the page, change "right" to "left" and "left" to "right".

Chapter 8: there are corrections to the mutual capacitance, but I will give those when we get to it.

Chapter 9: page 125, at bottom of page should read $W_e' = \frac{(Q')^2}{2C'}$ (a square and prime went missing in printing)

page 134: in the last equation, $\frac{1}{2\varepsilon}$ should read $\frac{1}{2\varepsilon_0}$

Chapter 10: page 140, line 2 should read: “the opposite direction to...” instead of “the opposite”

page 140, paragraph 3 from bottom, line 3, should read “electric current” instead of “electric field”

page 153 “semispherical” should be “hemispherical”

page 156 – figure for P10.9 does not make it clear that the cross-section of the resistor is a circle of radius *a*

Chapter 11: page 165, 2nd paragraph, line 4 “chapter 16” should say “chapter 6”

page 168, line 1 below Eq.(11.8) should read “.. the –x direction” instead of “...the x-direction”

page 171, 4th paragraph, line 3, change “1um” to “10um”

page 174, below Eq.(11.18) lines 2 and 3, replace “=” with “≈”

page 182: probelm P11.16 is not solvable using elementary techniques of symmetry (I made a mistake). The general solution can be found in a book by Zemanian from 1991. Let me know if you are interested

Chapter 12: page 185,in Fig.12.2.(b) the vector $dl_1 \times u_{r12}$ should be pointing OUT instead of INTO the paper

page 189, 3rd paragraph., line 4, exhange “left” and “right”

page 189, change vector d**l** on the right hand side of the figure to d**l’**

page 198, Example 12.10, line 6, 1st paragraph, should be “...B on y”, not “...B on x”

Chapter 13: page 216, line 2 from top should say Figure 13.4 (not Fig.13.5)

Chapter 14: replace Lentz by Lenz

page 261, top of coil in Fig.P14.20 wires should be wound in the opposite direction

Chapter 15: page 267, line 3, second paragraph, should read: ... the induced electric field in Eq. (14.3) and Eqs.(15.1) and (15.4),...”

page

Chapter 16: page 283, Figure 16.1, small shaded area should be a RECTANGLE

Chapter 17: page 306, lines 1 and 2 from bottom – replace 1997 by 2000 and 2G by 20G

page 317, line 3 from top should read Example 11.3 instead of Example 11.1

Chapter 18: page 322, Table 18.1: G' should be in S/m, R' in Ω/m. Also, there are for some reason two minus signs in the G' expressions. Please also add in caption that the proof for these expressions is given in Examples 20.4-20.6

page 334, in first displayed equation in Example 18.5 , replace tan^(-1) with cot

page 335, replace tan^(-1) with cot in first equation

page 346, Figure related to description of Smith chart got completely messed up in the printing process. I will post a separate file with the right one, and some additions.

page 355, P18.14, replace last line with: What lossless element(s) would you connect between the line and the load to have no reflected voltage on the line in this case?

Chapter 19: page 375, line 2 from top should read: A1.47 instead of A1.50

page 376, in Fig.19.5, dr should read dv'

Chapter 22: page 424, Fig.22.8, E_t,H_t should be replaced by E_2, H_2 in 4 places

page 424, Line 1, above equation (22.43) should read (22.41)

Chapter 23: page 440, line 1 below Eq.(23.23): 21.6 should read 21.5

Chapter 24:

Pg. 468 Line 4 below "24.6 the Friis…", replace "A_2(" by "A_{eff2}("

Pg. 469 Eq.(24.15), replace "A_2(" by "A_{eff2}("

Pg. 471 Eq.(24.19): "=D " should read

Pg.473 Fig.24.10(g): excitation of slot not ok, correct as marked on copy of figure

Chapter 25:

Pg. 482 Fig.25.4, "0.001" should read "0.01" (Dave) – needs to be checked with latest fiber data

Pg.483 Eq.(25.9): change "R_2" to "R_{eff}"
Fig.25.5: R must be normal to r as marked in the figure

Pg.489 At end of 2nd paragraph, add "and long-range short-wave radio links."

Pg.490 4th paragraph, line 3: delete "and at a 4-km height" (I am absolutely certain we corrected this in the copyediting!!!)

Appendices:

Pg.501 Fig.A1.1(a): points 1,2,3 missing (!)

Pg.504 Fig.A1.5: arrowhead at the end of r are missing
Fig.A1.4: "AB" should be italic, not bold

Pg.507 Fig.A1.8:
In the caption: "a starting" should be replaced by "the end"

Pg.510 Fig.A1.12: dl_1 should be a continuation of the dashed line, as marked in the copy of the figure
Line 2 above Fig.A1.13: u should be bold **u** (in three places)
Fig.A1.13: cone is not drawn correctly (lines are curved!)

Pg.511 Fig.A1.15: "r" missing
Fig.A1.15, "=rd(phi)" should read "=rd(theta)"

Pg.515 Fig.A1.17: dl_1, dl_2, dl_3 should be on the c_1, c_2, c3 axes

Pg.516 Line 2 from bottom: delete "screw"
Eq.(A.1.24) right side of equation, last two terms should be partial derivatives with respect to y and z, not x

Pg.517 1st equation, a minus (-) sign is missing in front of the last term

Pg.521 Fig.A1.20: lower should be

Pg.522 Line 2 below A1.4.7: "A1.29" should read "A1.27"
Last paragraph, line 2: "the vector F" should read " x F"

Pg. 523 1st paragraph should read: "The Stokes' and divergence theorems have… We will use them to derive…"
Line 1 above Eq.(A1.42): "A1.41" should read "A1.40"
Line 2 below Eq.(A1.43): "A1.43" should read "A1.42"

Pg.524 Line 1 from top: "A1.46" should read "A1.45"
In Eq.(A1.47), a term is repeated, see marked page

Pg.541 Line 2 above Eq.(A8.8): "(A8.3)" should read "(I_C)"
Line 1 below Eq.(A8.8): add at the end: "(for E_z=0)"

Pg.543 Line 1 from bottom: "m=1,2,…" should read "m=0,1,2,…"

Pg.544 Line 3 from top, Eq.(A8.26): "m=1,2,…" should read "m=0,1,2,…"
Delete "c=1/Vεμ"
Line 11 from bottom, put full stop after (A8.27), delete rest

Line 7 from bottom, “1,2,…” should be replaced by “0,1,2,…” in two places

Inner back cover left side, “Units”, line 6, delete “,i” in “symbol” column (only I, i* remain)

Workbook: *Introductory Electromagnetics: Practice Problems and Labs* (soft cover)

Corrections to workbook solutions, by chapter (posted as chapters are covered):

Chapter 1: page 6, TYPO: none of the forces are right, should be on the order of 10^-8N.

The velocity (final answer) is correct.

Chapter 3: page 18, P3.17, the correct answer is

$$E_z = \frac{Q}{8\pi\varepsilon_0 a^2}$$

Chapter 4: see solution to Hw1, to be posted during this week, for P41.1.

Chapter 5: page 28, P5.5 none of the solutions given is correct. Correct solution: between middle and edge plate for –sigma, 2sigma, -sigma case, it is V=2260V.

page 29, P5.6, change third possible answer to (c)

$$V(d/2) - V(-d/2) = 0$$
$$V(d/2) - V(0) = \rho d^2 / 8\varepsilon_0$$

page 30, the correct answer for the field outside the shell is

$$E(r) = \frac{b^3 - a^3}{3\varepsilon_0 r^2}\rho$$

page 31, P5.14, the correct answer for the potential for r>b is

$$V(r) = \frac{[Q_a^{'} + Q_b^{'}]\ln(b/r)}{2\pi\varepsilon_0}$$

Chapter 6: page 37, P6.7, clarification although obvious: the shell is conductive

page 37, P6.9, none of the given solutions is correct. Correct solution: ±0.833uC

page 39, equation on top of page should read (as we solved in class)

$$\sigma(x) = \varepsilon_0 E_{total} = \frac{Qh}{2\pi(h^2 + x^2)^{3/2}}$$

page 269, there is a typo in Prelab 3, Problem 3.3. It says: $J_S = \rho_S E$ and it should be $E = \rho_S J_S$ or $J_S = \sigma_S E$.

Chapter 7: page in the hints for P7.15 and 7.14, replace hints (7.14) and (7.15) by (7.26) and (7.27)

Chapter 10: page 86- none of the answers for P10.18 is correct. Choose from these instead:

(1) $R = \frac{1}{\pi\sigma R_1} + \frac{1}{\pi\sigma R_2}$, (2) $R = \frac{1}{2\pi\sigma R_1} + \frac{1}{2\pi\sigma R_2}$, (3) $R = \frac{1}{\pi\sigma d}$

Chapter 11: page 95, P11.16. It turns out this problem cannot be solved using elementary techniques as I originally thought. Prof. Kuester found the general solution in a book by Zemanian, *Infinite Electrical Networks,* Cambridge University Press, 1991, pp. 227-228. None of my answers are correct.

Chapter 12: page 103, P12.3, none of the given answers are correct. Choose from:

$(a) B(x) = \frac{\mu_0 I}{2\pi d} \ln \frac{(d/2) + x}{(d/2) - x}$

$(b) B(x) = \frac{\mu_0 I}{\pi d} \ln \frac{(d/2) + x}{x - (d/2)}$

$(c) B(x) = \frac{\mu_0 I}{2\pi d} \ln \frac{(d/2) - x}{(d/2) + x}$

Also, insert at the end: "In what direction is the field pointing?"

page 103, P12.4, none of the answers given are correct. Choose from:

$(a) B = 9.87 \times 10^{-11} T; (b) B = 1.974 \times 10^{-10} T; (c) B = 1.184 \times 10^{-8} T$

Chapter 13: page 124, in the hint for P13.16, change (13.12) to (13.18)-(13.19)

page 124, in the hint for P13.18, change (13.12) to (13.18)-(13.19)

Chapter 14: page 145, for Problem P14.22, none of the given answers are correct. Please replace solution with the following.

"The instantaneous number of turns between the contacts A and K is

$$n(t) = N\frac{x}{L} = \frac{N}{2}(1+\cos\omega_1 t)$$

Therefore, the total flux through all these turns is

$$\Phi_{total}(t) = n(t)\Phi(t) = \frac{N}{2}(1+\cos\omega_1 t)\Phi_m \cos\omega t$$

The induced emf, and therefore the open circuit voltage between A and K is thus

$$emf = e(t) = -d\Phi_{total}(t)/dt = \frac{N\Phi_m}{2}\left[\omega_1 \sin\omega_1 t\cos\omega t + \omega(1+\cos\omega_1 t)\sin\omega t\right]$$

The basic idea is similar to that of Example 14.2 in the text. "

Chapter 18: P18.14, replace last line with: What lossless element(s) would you connect between the line and the load to have no reflected voltage on the line in this case?

page 195, P18.24, none of the given solutions is correct. Choose from the following:

$(a) Z = (55.1 - j83.5)\Omega, VSWR = 3.69;$

$(b) Z = (38.0 - j41.2)\Omega, VSWR = 4.27;$

$(c) Z = (46.3 + j28.8)\Omega, VSWR = 2.27$

page 198, P18.36, the possible solutions should be:

$(a) Z_L = (267 - j179)\Omega; (b) Z_L = (186 + j210)\Omega; (c) Z_L = (267 + j179)\Omega$

page 198, P18.37, the possible solutions should be:

$(a)\rho = 0.544e^{j23^\circ}, VSWR = 3.39; (b)\rho = 0.367e^{-j36^\circ}, VSWR = 2.16; (c)\rho = 0.227e^{-j33^\circ}, VSWR = 1.59$