

3B1 2013 – Numerical answers

- 1 (a) $2.83 \times 10^{-8} \text{ W m}^{-2}$, $E = 4.62 \times 10^{-3} \text{ V m}^{-1}$, $H = 1.23 \times 10^{-5} \text{ A m}^{-1}$
(b) $R_r = 8.43 \times 10^{-6} \Omega$, $e = 0.004 \%$
(c) $A_e = 71.5 \text{ m}^2$, $R_m = 0.84 \Omega$, $G = -42.2 \text{ dB}$
(d) $Q = 97.4$, $B/W = 796 \text{ Hz}$
- 2 (b) Chebyshev, LP 500 Hz, $C1 = 22.2 \text{ nF}$, $R1 = 840 \Omega$, $C2 = 19.8 \text{ nF}$, $R2 = 7590 \Omega$
HP 100 Hz, $C3 = 228 \text{ nF}$, $R3 = 840 \Omega$, $C4 = 256 \text{ nF}$, $R4 = 7590 \Omega$
- 3 (b) $\lambda/2 = 9.33 \text{ mm}$, $w = 0.77 \text{ mm}$
(c) $1.4 - j2$ on Smith chart = $70 - j100 \Omega$
(d) $0.378 \lambda = 7.07 \text{ mm}$, $C = 0.172 \text{ pF}$
- 4 (b) $L = 100 \text{ nH}$, $C = 695 \text{ pF}$, $R3 = 300 \Omega$, $C_{fb} = 10 \text{ nF}$, $R2 = 3.3 \text{ k}\Omega$, $R_d = 150 \Omega$
(c) $R1 = 11 \text{ k}\Omega$, $R2 = 2.2 \text{ k}\Omega$, $R3 = 47 \Omega$, $R4 = 300 \Omega$, $C = 1 \text{ nF}$
(d) 70.3 MHz
(e) $L_m = 1.5 \text{ nH}$, $C_s = 0.47 \text{ pF}$, $L_p = 1.66 \text{ nH}$