

Answers

Answers to some (but not all) of the numerical problems are given here as an aid to students. There are many design problems included in the problem sets for which there are no single answers. In these cases a ‘correct’ answer is one which satisfies the numerical design constraints but which can also be constructed using components with normal tolerances and within the usage limitations specified in the component data sheets.

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|--|---|
| 1.1: 15 mV. | 6.2: $1.8\ \Omega$, 6.7 A, 33 A |
| 1.2: 12.1 k Ω | 6.3: -900 V , -741 V , -635 V , |
| 1.3: 71.4 k Ω , 64.6 k Ω , 0.31 mA, | -529 V , -423 V , -317 V , -211 V , |
| 0.33 mA, 0.30 mA. | -105 V , |
| 1.4: 9 V, 1.91 mA | 6.4: 11.5 W, 5.7°C |
| 1.5: $\leq 0.96\text{ mA}$ | |
| 1.11: $0.25\ \mu\text{m}$ | 7.1: -6 dB |
| | 7.2: $79\ \Omega$, 24921 Ω |
| 2.1: 1.88 V, 5.06 V, 7.59 V, 14.53 V | 7.3: 22.9 mV, -43.4 dB |
| 2.2: 3.0 mA, 14.1 V, 14.46 V | 7.4: 10^{-6} Wm^{-2} , 1 Wm^{-2} |
| 2.3: $+2.47\text{ V}$, -3.53 V | |
| | 8.1: 0.269 ms, 0.603 ms, 0.936 ms, |
| 3.2: 327 Ω | 1.269 ms, $\dots, T = 0.666\text{ ms}$ |
| 3.3: 0.89 V, 2.19 mA, 0.16 mA, | 8.2: 33.9 mV |
| 0.13 mA | 8.5: 2.84 V, 2.53 V, 2.84 V, 2.84 V |
| 3.4: 7.23 V | |
| 3.5: 50 mA, 10 mA | 9.1: $2.12\text{ V}_{\text{RMS}}$ |
| 3.6: 0.5 mm^2 , $0.64\ \Omega$ | |
| | 10.1: $6.9\text{ A}_{\text{RMS}}$ |
| 4.1: 500 k Ω , 400 k Ω , 50 k Ω , 50 k Ω | 10.2: $0.38\text{ A}_{\text{pp}}$, $0.565\text{ A}_{\text{pp}}$ |
| 4.2: 0.99 V, 0.099 V, 9.9 mV, 0.99 mV | |
| 4.4: -9.0 V , -6.54 V , -3.55 V , | 11.1: 0.28 V |
| -0.55 V , $+3.73\text{ V}$, $+8.0\text{ V}$ | 11.2: 1333 As^{-1} |
| | 11.3: $5\ \mu\text{H}$ |
| 5.1: 833 Ω | 11.5: 49 |
| 5.2: 800 Ω | |
| 5.3: 0.25 V, 62.5 mV, 15.6 mV, | 12.1: $-j1592\ \Omega$, $-j19.9\ \Omega$ |
| 3.9 mV, 0.98 mV | 12.2: $+j6.28\ \Omega$, $+j3140\ \Omega$ |
| | |
| 6.1: 2.08 A, $5.76\ \Omega$ | 13.2: $2297\ \Omega$, -0.29 rad |

- 13.3: $3322\ \Omega$, $+0.116\text{ rad}$
- 14.1: $(320 + j1884)\ \Omega$
 14.2: $(680 - j48)\ \Omega$
 14.3: $(253 - j702)\ \Omega$
 14.4: $(11.5 + j2.21)\ \Omega$
- 15.2: -1.7 dB , -0.604 rad
 15.3: -2.5 dB , $+0.724\text{ rad}$
 15.4: -1.51 dB , -0.573 rad
 15.6: 1856 Hz , 45°
- 19.2: 10.93 V , $1277\ \Omega$
- 20.1: 8.86 mA , $740\ \Omega$
- 21.1: 19.8 mA
 21.3: 8.66 V
- 22.1: $40\text{ k}\Omega$, $8.2\text{ k}\Omega$, $4.0\text{ k}\Omega$, $559\ \Omega$
- 23.1: $0.55\ \mu\text{m}$
- 24.2: $11\ \mu\text{A}$, $16\ \mu\text{A}$, 4.4 mA , 6.6 mA ,
 $0.5 \times 10^{-3}\text{ AV}^{-1}$, 0.22 AV^{-1}
- 25.1: 0.35 V , 0.44 V
 25.4: 0.8 W
- 26.1: 1.91 mA , 7 V , 0.7 V
 26.2: 12 V , 7.48 V , 0.7 V
 26.4: 0.977 A , 5 V , 1.09 V
- 27.2: 4.2 mV
 27.3: 11 mV_{pp}
- 29.1: 7.4 V , 3.18 V , 0.7 V
- 29.2: 1.38 V , $1.54\text{ k}\Omega$
- 31.1: 0 V , 0.7 V , 6.16 V , 1.16 mA ,
 $7.75\ \mu\text{A}$, 1.16 mA
 31.4: 5.05 V , 5.75 V , 10 V , 1.87 mA ,
 $6.24\ \mu\text{A}$, 1.87 mA
 31.8: 4.2 V , 4.9 V , 9.5 V , 0.75 mA ,
 $0.75\text{ mA}/\beta$, 0.75 mA
- 33.1: -339
 33.2: -173
 33.3: -71
- 34.1: 2.82 V
- 39.3: -17.6
 39.7: $12\text{ k}\Omega$, $216\text{ k}\Omega$
- 40.1: $+18.4$
- 43.1: -7.05 V , -0.18 V
 43.4: 4.92 mV , 4.1 V
- 44.1: $0.495\text{ V}_{\text{amplitude}}$ square wave
- 45.3: $0.37\text{ V}_{\text{amplitude}}$ cos waveform
- 49.1: 27 dB , $\approx 20\text{ kHz}$
- 50.1: $0.1\text{ mV}_{\text{RMS}}$
- 51.1: 0.08 Hz
 51.2: $330\ \mu\text{V}_{\text{RMS}}$
- 55.1: 1.22 mV