

Antenna IQ Test

1. An antenna has a diameter of 10λ . What is the far-field distance for this antenna, in wavelengths?
 - (a) 20λ
 - (b) 100λ
 - (c) 10λ
 - (d) 200λ
2. How does the far-field amplitude vary with distance from an antenna?
 - (a) increases as r
 - (b) constant with r
 - (c) decreases as $1/r$
 - (d) decreases as $1/r^2$
3. What is the difference between gain and directivity?
 - (a) gain is always larger
 - (b) directivity is always larger
 - (c) gain includes the effect of losses
 - (d) directivity includes the effect of losses
4. What is the directivity of a half-wave dipole?
 - (a) 0 dBi
 - (b) 2.2 dBd
 - (c) 1.6 dBi
 - (d) 2.2 dBi
5. A particular antenna radiates a uniform (constant) pattern in the upper hemisphere, with no radiation in the lower hemisphere. What is the directivity?
 - (a) 0 dB
 - (b) 2 dB
 - (c) 0.5 dB
 - (d) 3 dB
6. An pencil-beam antenna has a beamwidth of 3° . What is the directivity?
 - (a) 40 dB
 - (b) 36 dB
 - (c) 30 dB
 - (d) 0 dB
7. Radiation from a particular antenna is propagating along the x -axis, and is polarized in the y -direction. What is the direction of the magnetic field vector?
 - (a) along x -axis
 - (b) along y -axis
 - (c) along z -axis
 - (d) cannot determine

8. What is the polarization mismatch, in dB, between an incident wave polarized along the x -axis, and a circularly polarized receive antenna?

- (a) $-(\infty)$ dB
- (b) 0 dB
- (c) 3 dB
- (d) 2 dB

9. An antenna has an effective aperture area of 0.5 m^2 . If an incident wave has a power density of 3 mW/m^2 , what is the received power?

- (a) 1.5 mW
- (b) 0.75 mW
- (c) 6.0 mW
- (d) 0.3 mW

10. What is the approximate input impedance of a half-wave dipole antenna?

- (a) $72 + j 42 \Omega$
- (b) $36 + j 21 \Omega$
- (c) $100 + j 0 \Omega$
- (d) 50Ω

11. A short dipole antenna has a loss resistance of 0.5Ω , and a radiation resistance of 0.5Ω . What is the efficiency of the dipole?

- (a) 10%
- (b) 50%
- (c) 100%
- (d) 200%

12. What is the input impedance of a quarter-wave monopole?

- (a) 50Ω
- (b) 75Ω
- (c) $36 + j 21 \Omega$
- (d) $72 + j 42 \Omega$

13. Consider a horizontal dipole mounted $\lambda/4$ above a horizontal ground plane. What expression represents the H-plane pattern, assuming θ is measured from the normal axis of the ground plane?

- (a) $\sin \theta$
- (b) constant
- (c) $\sin^2 \theta$
- (d) $\cos \theta$

14. What is the maximum allowable spacing for a uniform linear broadside array if grating lobes are to be avoided?

- (a) $\lambda/10$

- (b) $\lambda/2$
- (c) λ
- (d) $3\lambda/2$

15. What is the directivity of a 20 element linear broadside array of isotropic elements having $\lambda/2$ spacing?

- (a) 10 dB
- (b) 13 dB
- (c) 16 dB
- (d) 20 dB

16. A particular linear array of isotropic sources has a directivity of 10 dB. If the isotropic sources are replaced with elements having a directivity of 6 dB, what is the new directivity of the array?

- (a) 16 dB
- (b) 4 dB
- (c) 10 dB
- (d) more than 10 dB

17. What is the sidelobe level of a 28 element linear array of dipoles over a ground plane, having a uniform amplitude distribution and half-wave spacing?

- (a) 23 dB
- (b) 13 dB
- (c) 10 dB
- (d) 0 dB

18. A square aperture antenna has a tapered amplitude distribution. If the aperture is 2λ long on a side, and its aperture efficiency is 50%, what is the directivity of the antenna?

- (a) 6 dB
- (b) 10 dB
- (c) 14 dB
- (d) 15 dB

19. Consider an H-plane sectoral horn antenna. For a given aperture size, how should the length of the horn be chosen to maximize the gain?

- (a) let the length equal the aperture width
- (b) minimize the horn length
- (c) maximize the horn length
- (d) it does not matter

20. A rectangular microstrip antenna lies in the x - y plane, with its resonant dimension along the y -axis. What coordinate plane defines the E-plane of the antenna?

- (a) the x - y plane
- (b) the x - z plane
- (c) the y - z plane
- (d) the constant- ϕ plane

21. Two microstrip antennas operating at the same frequency are fabricated on two different substrates, with different dielectric constants. Which one has the larger directivity?

- (a) the one with the lower dielectric constant
- (b) the one with the higher dielectric constant
- (c) they have the same directivity
- (d) not enough information to decide

22. A particular probe-fed microstrip antenna has a measured input impedance of $200\ \Omega$. How should the feed probe be moved to match the antenna to $50\ \Omega$?

- (a) move the probe closer to the edge
- (b) move the probe closer to the center of the patch
- (c) move the probe to the other side of the patch
- (d) change the size of the patch

23. A square planar microstrip array consists of 4×4 elements, with $\lambda/2$ spacing. What is the approximate directivity of the array?

- (a) 10 dB
- (b) 12 dB
- (c) 13 dB
- (d) 15 dB

24. How does the resonant frequency of a microstrip antenna vary with changes in the element length and the substrate dielectric constant?

- (a) decreases with length, decreases with dielectric constant
- (b) decreases with length, increases with dielectric constant
- (c) increases with length, decreases with square root of dielectric constant
- (d) decreases with length, decreases with square root of dielectric constant

25. A large phased array antenna has a gain of 30 dB for a broadside beam. What would you expect the gain to be when the beam is scanned to 60° from broadside?

- (a) 30 dB
- (b) 27 dB
- (c) 15 dB
- (d) 0 dB