

Circle the answer that is most correct.

(i) A 3 MHz vertically polarized transmitter radiates groundwaves over soil with relative permittivity $2 - j50$. The phase parameter b in degrees for this case is:

- (a) 0. (b) 3.44 (c) 30.9 (d) 91.14 (e) 178.85

(ii) Which of the following statements are true about ground waves?

- (a) when the planar Earth theory is valid, the field amplitude decays as one over the distance
(b) when the spherical Earth theory is valid, the field amplitude decays as one over the distance
(c) ground waves attenuate more rapidly with distance when the conductivity of the ground is increased
(d) the planar Earth theory is valid as long as the distance between source and receiver is sufficiently small
(e) none of the above

(iii) Which of the following is true?

- (a) for sufficiently low antennas, the planar Earth theory predicts that path loss does not depend on frequency
(b) for sufficiently low antennas, the Hata model predicts that path loss does not depend on frequency
(c) the Lee model predicts that path loss does not depend on the height of the receive antenna
(d) the Cost-231 extension of the Hata model predicts that path loss does not depend on the height of the receive antenna
(e) none of the above

(iv) A system can operate so long as the received power exceeds -80 dB,W. The average received power is -65 dB,W, and the system operates in an environment where slow fading effects have a standard deviation of 5 dB. What percent of the time would the system be expected to fail due to slow fading?

- (a) 0.002 (b) 0.08 (c) 0.13 (d) 2.58 (e) 15.87