

Circle the answer that is most correct.

(i) In which of the following frequency bands is the ionosphere most likely to play an important role in propagation?

- (a) EHF
- (b) SHF
- (c) UHF
- (d) VHF
- (e) HF**

(ii) A dispersive medium

- (a) has an effective permittivity that is a function of frequency**
- (b) has an effective permittivity that is a function of space
- (c) has a group velocity equal to the phase velocity
- (d) is lossless
- (e) none of the above

(iii) A plane wave propagating in free space has an electric field

$$\underline{\bar{E}} = \hat{z}e^{-j50(x+y)} \text{ (V/m)}.$$

The frequency and magnetic field of this plane wave are, respectively,

- (a) 3.38 GHz, $\frac{(\hat{x} + \hat{y})}{\eta_0} e^{-j50(x+y)}$ (A/m)
- (b) 2.39 GHz, $\frac{(\hat{x} + \hat{y})}{\eta_0} e^{-j50(x+y)}$ (A/m)
- (c) 3.38 GHz, $\frac{1}{\eta_0} \left(\frac{\hat{x} - \hat{y}}{\sqrt{2}} \right) e^{-j50(x+y)}$ (A/m)**
- (d) 2.39 GHz, $\frac{1}{\eta_0} \left(\frac{\hat{x} - \hat{y}}{\sqrt{2}} \right) e^{-j50(x+y)}$ (A/m)
- (e) none of the above

(iv) An antenna of dimension 5 m transmits at 600 MHz in free space to a receiver with an antenna of dimension 1 m. What is the minimum distance the transmitter and receiver should be separated by in order to be in the “far field”?

- (a) 80 cm
- (b) 30 m
- (c) 144 m**
- (d) 258 m
- (e) none of the above