EE 382 Applied EM Quiz #8 (Spring 2018)

Name _____**KEY A**_____

Instructions: Closed book. Circle correct answers.

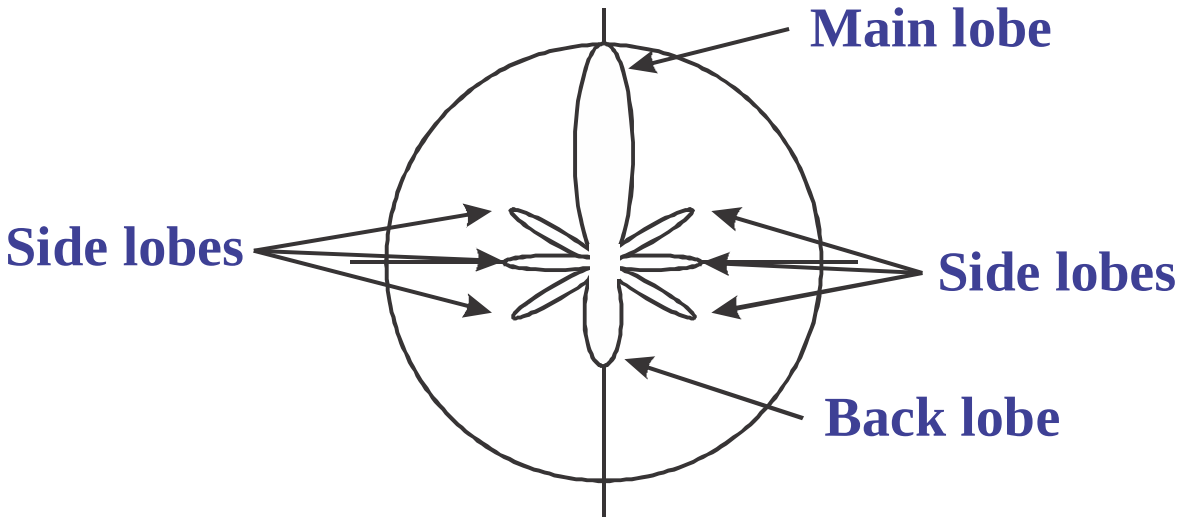
1) The radiation intensity $U(\theta,\phi)$ is defined as: a) $\frac{1}{2}\text{Re}\left\{\bar{E}\times\bar{H}^*\right\}$ (W/m^2), **b) $r^2\mathcal{P}_{\text{ave}}$ (W/sr)**, c) $\frac{P_{\text{rad}}}{P_{\text{in}}}$, d) $\frac{\lambda^2}{4\pi}D(\theta,\phi)$ (m^2), or e) how long it takes to heat a burrito to 120º in a microwave.

2) The time-average Poynting vector (AKA: power density) is defined as: **a) $\frac{1}{2}\text{Re}\left\{\bar{E}\times\bar{H}^*\right\}$ (W/m^2)**, b) $r^2\mathcal{P}_{\text{ave}}$ (W/sr), c) $\frac{P_{\text{rad}}}{P_{\text{in}}}$, d) $\frac{\lambda^2}{4\pi}D(\theta,\phi)$ (m^2), or e) the direction of a compass needle.

3) The Friis transmission formula is: a) used by Dr. Who to communicate with the TARDIS, **b) $P_{\text{r}}=G_{dt}G_{dr}\left[\frac{\lambda}{4\pi R}\right]^2 P_t$**, c) a transmission oil additive, or d) $P_{\text{r}}=\frac{G_{dt}G_{dr}}{4\pi}\left[\frac{\lambda}{4\pi R_1R_2}\right]^2\sigma\,P_t$.

4) The scattering cross section (AKA radar cross section): a) is the maximum cross-sectional area of a target, **b) is used to characterize how a target reflects EM radiation**, c) is the width of a radiation pattern, or d) describes how children disperse on the playground at recess.

5) For the radiation pattern shown below, identify the main lobe(s), side lobe(s), and back lobe(s).



EE 382 Applied EM Quiz #8 (Spring 2018)

Name _____**KEY B**_____

Instructions: Closed book. Circle correct answers.

1) The radiation intensity $U(\theta,\phi)$ is defined as: a) $\frac{\lambda^2}{4\pi}D(\theta,\phi)$ (m^2), **b) $r^2\mathcal{P}_{\text{ave}}$ (W/sr)**, c) $\frac{P_{\text{rad}}}{P_{\text{in}}}\times 100\%$, d) $\frac{1}{2}\text{Re}\left\{\bar{E}\times\bar{H}^*\right\}$ (W/m^2), or e) how long it takes to make popcorn in a microwave.

2) The time-average Poynting vector (AKA: power density) is defined as: a) $\frac{\lambda^2}{4\pi}D(\theta,\phi)$ (m^2), b) $r^2\mathcal{P}_{\text{ave}}$ (W/sr), c) the direction of a compass needle, **d) $\frac{1}{2}\text{Re}\left\{\bar{E}\times\bar{H}^*\right\}$ (W/m^2)**, or e) $\frac{P_{\text{rad}}}{P_{\text{in}}}\times 100\%$.

3) The Friis transmission formula is: **a) $P_{\text{r}} = G_{dt}G_{dr}\left[\frac{\lambda}{4\pi R}\right]^2 P_t$**, b) a secret cipher used by the illuminati, c) $P_{\text{r}} = \frac{G_{dt}G_{dr}}{4\pi}\left[\frac{\lambda}{4\pi R_1 R_2}\right]^2 \sigma\, P_t$, or d) a proprietary transmission oil additive.

4) The scattering cross section (AKA radar cross section): a) is the maximum cross-sectional area of a target, b) describes how children disperse on the playground at recess, c) is the width of a radiation pattern, or **d) is used to characterize how a target reflects EM radiation**.

5) For the radiation pattern shown below, identify the main lobe(s), side lobe(s), and back lobe(s).