Unit 14 - Week 11

Assignment 11

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.

Due on 2019-10-16, 23:59 IST.

Instructions:
The objective of these questions is to assess your understanding of this week's content. You are not expected to memorize any of the questions, rather, you should derive the answers from first principles based on what you have learnt so far.

1) Which of the following methods lends itself easily to an inverse problem formulation (where scattered fields are known, and the permittivity needs to be computed)? ***1 point***

- Surface Integral Equations
- Volume Integral Equations
- Both A and B
- Neither A nor B

No, the answer is incorrect.
Score: 0
Accepted Answers:
Volume Integral Equations

2) Which of the following equations give the correct relation between magnetic vector potential $\vec{A}$, electric field $\vec{E}$ and the scalar potential ϕ for an antenna radiating at frequency ω ? ***1 point***

- $\vec{E} = -j\omega\vec{A} - \nabla\phi$
- $\vec{E} = -j\omega\vec{A} + \nabla\phi$
- $\vec{E} = j\omega\vec{A} - \nabla\phi$
- $\vec{E} = j\omega\vec{A} + \nabla\phi$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$\vec{E} = -j\omega\vec{A} - \nabla\phi$

3) When the magnetic vector potential is varying only in z direction, then the Lorenz gauge condition in an antenna radiation problem becomes ***1 point***

- $\frac{\partial A_z}{\partial z} = -j\omega\phi/\mu\epsilon$
- $\frac{\partial A_z}{\partial z} = j\omega\phi/\mu\epsilon$
- $\frac{\partial A_z}{\partial z} = j\omega\mu\epsilon\phi$
- $\frac{\partial A_z}{\partial z} = -j\omega\mu\epsilon\phi$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$\frac{\partial A_z}{\partial z} = -j\omega\mu\epsilon\phi$

4) The electric field magnitude E of a Hertz dipole antenna at far field varies as ***1 point***

- E = constant
- $E \propto 1/r$
- $E \propto 1/r^2$
- None of the above

No, the answer is incorrect.
Score: 0
Accepted Answers:
$E \propto 1/r$

5) The electric and magnetic field of a Hertz dipole antenna at far field is in the _____ and _____ directions respectively? ***1 point***

- $\hat{\theta}, \hat{\phi}$
- $\hat{\theta}, \hat{r}$
- $\hat{\phi}, \hat{\theta}$
- $\hat{\phi}, \hat{r}$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$\hat{\theta}, \hat{\phi}$

6) What is the dominant nature of power radiated by the Hertz dipole antenna (given by its Poynting vector) at the near field? ***1 point***

- Active Power
- Reactive Power
- Both
- None of the above

No, the answer is incorrect.
Score: 0
Accepted Answers:
Reactive Power

7) The field pattern ($|E(\theta)|/|E_{max}(\theta)|$) of a Hertz dipole antenna in the direction $\theta = 90^o$ is equal to ***1 point***

- 0
- 1
- ∞
- None of the above

No, the answer is incorrect.
Score: 0
Accepted Answers:
1

8) The radiation pattern of an end-fire antenna (aligned along the $\hat{z}$ direction) has a maxima at ***1 point***

- $\theta = 0$
- $\theta = 90$
- $\theta = 180$
- Both A and C

No, the answer is incorrect.
Score: 0
Accepted Answers:
Both A and C

9) The known and the unknown variables in an inverse imaging problem are _____ and _____ respectively. ***1 point***

- Permittivity of tissue, Electric field outside the tissue
- Electric field outside the tissue, Permittivity of tissue
- Geometry of tissue, Electric field outside the tissue
- None of the above

No, the answer is incorrect.
Score: 0
Accepted Answers:
Electric field outside the tissue, Permittivity of tissue

10) In the state equation $u - G_D X u = e$ (where $r \in D$ is domain of interest and χ is the dielectric contrast), the elements of the matrix G_D are proportional to: ***1 point***

- $\int_D G(r, r')\chi(r)E(r')dr'$
- $\int_D G(r, r')E(r')dr'$
- $\int_D G(r, r')dr'$
- None of the above

No, the answer is incorrect.
Score: 0
Accepted Answers:
$\int_D G(r, r')dr'$