

Unit 4 - Week 1

Course outline
How to access the portal?
Pre-Requisite Assignment
MATLAB Access and Learning Modules
Week 1
<ul style="list-style-type: none"> Review of Vector Calculus : Chain rule of differentiation Review of Vector Calculus : Gradient, Divergence, and Curl operators Review of Vector Calculus : Common theorems in vector calculus Review of Vector Calculus : Corollaries of these theorems CEM:An Overview : Mathematical History CEM:An Overview : Different regimes of Maxwell's equations CEM:An Overview : Different ways of solving them Review of Maxwell's Equations : Maxwell's Equations Review of Maxwell's Equations : Boundary Conditions Review of Maxwell's Equations : Uniqueness Theorem Review of Maxwell's Equations : Equivalence Theorem Quiz : Assignment 1 Week 1 Feedback : Computational Electromagnetics
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Assignment 1

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

Due on 2019-08-14, 23:59 IST.

- 1) A vector field is specified (up to a constant) if its _____ and _____ are known. 1 point
- Gradient and Curl
 Gradient and Divergence
 Divergence and Curl
 All of the above
- No, the answer is incorrect.**
Score: 0
Accepted Answers: *Divergence and Curl*
- 2) To what family of computational electromagnetic (CEM) techniques does the commonly used form of the Finite Element Method (FEM) belong? 1 point
- Time domain, Differential form
 Time domain, Integral form
 Frequency domain, Differential form
 Frequency domain, Integral form
- No, the answer is incorrect.**
Score: 0
Accepted Answers: *Frequency domain, Differential form*
- 3) If an object (with size of order L meters) is illuminated by an electromagnetic radiation of wavelength λ meters, then in which range are optics/ray-like solutions obtained? 1 point
- Low frequency, $L \ll \lambda$
 Mid frequency, $L \approx \lambda$
 High frequency, $L \gg \lambda$
 None of the above
- No, the answer is incorrect.**
Score: 0
Accepted Answers: *High frequency, $L \gg \lambda$*
- 4) Which of the following methods are usually formulated in the frequency domain? 1 point
- FDTD
 IEM
 FEM
 None of the above
- No, the answer is incorrect.**
Score: 0
Accepted Answers: *IEM, FEM*
- 5) Which of the following methods are formulated using the differential form of Maxwell's equations? 1 point
- FDTD
 FEM
 IEM
 None of the above
- No, the answer is incorrect.**
Score: 0
Accepted Answers: *FDTD, FEM*
- 6) Tangential component of the electric field \vec{E} to a surface with normal \hat{n} is given by 1 point
- $\hat{n} \times \vec{E}$
 $\hat{n} \cdot \vec{E}$
 $\hat{n} \cdot (\hat{n} \times \vec{E})$
 $\vec{E} - (\vec{E} \cdot \hat{n})\hat{n}$
- No, the answer is incorrect.**
Score: 0
Accepted Answers: *$\vec{E} - (\vec{E} \cdot \hat{n})\hat{n}$*
- 7) Average power density (power per unit area) of an electromagnetic wave is given by the following relation between the field phasors: 1 point
- $\frac{1}{2} \text{Re}(E \times H^*)$
 $\frac{1}{2} \text{Re}(E \times H)$
 $\frac{1}{2} \text{Im}(E \times H^*)$
 $\frac{1}{2} \text{Im}(E \times H)$
- No, the answer is incorrect.**
Score: 0
Accepted Answers: *$\frac{1}{2} \text{Re}(E \times H^*)$*
- 8) Boundary conditions _____ and _____ are derived from Coulomb's and Faraday's law by applying _____ and _____ theorems, respectively 1 point
- $\hat{n} \cdot (D_2 - D_1) = \rho_{es}$
 $\hat{n} \times (H_2 - H_1) = J_s$
 $\hat{n} \times (E_2 - E_1) = M_s$
 $\hat{n} \cdot (B_2 - B_1) = \rho_{ms}$
 Gauss Divergence Theorem
 Poynting's Theorem
 Stokes Theorem
- No, the answer is incorrect.**
Score: 0
Accepted Answers: *$\hat{n} \cdot (D_2 - D_1) = \rho_{es}$, $\hat{n} \times (E_2 - E_1) = M_s$, Gauss Divergence Theorem, Stokes Theorem*
- 9) Electromagnetic fields are uniquely determined if at least which of the following are known: 1 point
- Tangential component of electric field over surface S
 Normal component of electric field over surface S
 Tangential component of magnetic field over surface S
 Normal component of magnetic field over surface S
- No, the answer is incorrect.**
Score: 0
Accepted Answers: *Tangential component of electric field over surface S, Tangential component of magnetic field over surface S*
- 10) According to the Volume Equivalence theorem, the equivalent currents M_{eq} and J_{eq} are defined, respectively, by 1 point
- $j\omega(\epsilon - \epsilon_0)E$ and $j\omega(\mu - \mu_0)H$
 $j\omega(\mu - \mu_0)H$ and $j\omega(\epsilon - \epsilon_0)E$
 $j\omega(\mu - \mu_0)E$ and $j\omega(\epsilon - \epsilon_0)H$
 $j\omega(\epsilon - \epsilon_0)H$ and $j\omega(\mu - \mu_0)E$
- No, the answer is incorrect.**
Score: 0
Accepted Answers: *$j\omega(\mu - \mu_0)H$ and $j\omega(\epsilon - \epsilon_0)E$*
- 11) Tangential boundary conditions state that $\hat{n} \times (E_2 - E_1) = \underline{\hspace{2cm}}$ and $\hat{n} \times (H_2 - H_1) = \underline{\hspace{2cm}}$, with normal \hat{n} pointing from medium 1 to medium 2 1 point
- $-M_s$ and J_s
 J_s and $-M_s$
 M_s and $-J_s$
 $-J_s$ and M_s
- No, the answer is incorrect.**
Score: 0
Accepted Answers: *$-M_s$ and J_s*
- 12) The main idea behind surface equivalence theorem is to replace the object by 1 point
- volume charges
 surface charges
 volume currents
 tangential surface currents
- No, the answer is incorrect.**
Score: 0
Accepted Answers: *tangential surface currents*