Roll No. .....

3099

B. Tech. 4th Semester (EE) Examination – July, 2021

ELECTROMAGNETIC FIELDS

Paper : PCC-EE-216-G

Time : Three hours] *[Maximum Marks : 75*

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt ***five*** questions in all, selecting ***one*** question from each Section (**A, B, C & D**). Question Number **1** is ***compulsory***. All question carry equal marks.

1. (a) What are the uniform plane waves ? $2.5 \times 6 = 15$

(b) Define skin depth.

(c) What is Brewster angle ?

(d) What is the difference between irrotational field and the solenoidal field ?

(e) What is the net effect (on D) of applying electric field to a dielectric ?

(f) Prove :

$$\nabla . (\nabla \times H) = 0$$

SECTION – A

2. Transform the vector $4\hat{a}_x - 2\hat{a}_y - 4\hat{a}_z$ into spherical and cylindrical coordinates at point (–2, – 3, 4). 15

3. (a) With neat diagrams, explain Spherical system with coordinates (r, θ ,□). Also find line, surface and volume integral for it. 10

(b) State and prove Divergence theorem. 5

SECTION – B

4. Given the potential $V = \frac{10}{r^2}\sin\theta\cos\phi$: 15

(a) Find electric flux density D at $(2, \pi/2, 0)$.

(b) Calculate work done in moving a 10 μC charge from point A (1, 30°, 120°) to B(4, 90°, 60°).

5. (a) Explain Gauss law of Electrostatic and describe few applications of Gauss's Law. 10

(b) Derive relationship between polarization and electric field intensity. 5

SECTION – C

6. Describe boundary conditions of magneto static field for two different magnetic media. 15

7. (a) Derive the expression for energy stored in magnetic field. 5

(b) Define magnetic vector potential and derive an expression for vector potential due to long wire of small circular cross section carrying the current of 1 ampere. 10

SECTION – D

8. Derive Maxwell's equation from electrostatic and magneto static field. 15

9. What do you understand by electromagnetic waves ? .Explain wave propagation in lossy dielectrics and derive wave equations for the same. 15

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B.Tech. (E.E.) 4th Semester (G-Scheme)
Examination, July–2022
ELECTROMAGNETIC FIELDS
Paper– PCC-EE-216-G

Time allowed : 3 hours] *[Maximum marks : 75*

Note : *Attempt five questions in total, selecting at least one from each section.* ***First Question is compulsory.***

1. (a) Write about the magnetic vector potential. 6×2.5

(b) State Biot-Savart,s law.

(c) What is divergence of Curl of a vector?

(d) Explain the skin effect.

(e) Differentiate between scaler field and vector field. Give examples.

(f) What is Ampere's law?

Section - A

2. Transform Vector $A = y\hat{a}_x + (x+z)\hat{a}_y$ into spherical co-ordinate system. Also evaluate its value at P(–2, 6, 3) 15

3. (a) Describe the gradient of a scaler field. 7.5

(b) Differentiate between linear / elliptical and circular polarization. 7.5

Section - B

4. (a) Define dielectric - dielectric boundary conditions. 7.5

   (b) Derive the Maxwell's curl equation for time varying electric fields. 7.5

5. (a) Develop an expression for the potential difference at any point between spherical shells in terms of the applied potential employing Laplace's equation. 7.5

   (b) Define electrostatic energy and electric density. 7.5

Section - C

6. Write notes on:- 15

   (i) Magnetic boundary Conditions.

   (ii) Point form of Maxwell's equation.

7. Write notes on:- 15

   (i) Force on a differential current element.

   (ii) Magnetic circuits.

Section - D

8. (a) Write Maxwell's equation in time varying fields and give their interpretation. 7.5

   (b) State Poynting theorem. 7.5

9. Write notes on:- 15

   (i) Electromagnetic waves.

   (ii) Wave equation in phasor form.

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B. Tech. 4th Semester (EE) Examination – May, 2023

ELECTROMAGNETIC FIELDS

Paper : PCC-EE-216-G

Time : Three hours] *[Maximum Marks : 75*

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt ***five*** questions in all, selecting ***one*** question from each Section. Question No. 1 is ***compulsory***. All questions carry equal marks.

1. (a) Explain the difference between scalar magnetic potential and vector magnetic potential. 2.5 × 6

(b) State point form of Ohm's law and Gauss's law.

(c) Write the wave equation in a conducting medium.

(d) Explain the circular cylindrical coordinate system.

(e) What do you mean by equipotential surfaces ?

(f) Give the expression for energy stored in a static electric field.

SECTION – A

2. (a) Express $2x\hat{i} - 3y^2\hat{j} + xz\hat{k}$ is cylindrical coordinate. 7.5

(b) Describe the curl operator. 7.5

3. Given point $P(-2, 6, 3)$ and vector $A = yax + (x + z)\, ay$. Evaluate A and P is Cartesian, cylindrical and spherical systems. 15

SECTION – B

4. (a) Derive the electric field for each possible case due to an uniformly charged sphere of Radius R and volume charge density ρ. 7.5

(b) Derive the equation of continuity for time varying fields. 7.5

5. (a) Describe the analogies between electric and magnetic fields. 7.5

(b) Differentiate between electrostatic energy and electric density. 7.5

SECTION – C

6. Write notes on : 15

(a) Inductance and mutual inductances

(b) Motional electromotive forces

7. (a) State and prove Biot-Savart's law. 7.5

(b) Explain the concept of displacement current. How is this different from conduction current ? 7.5

SECTION – D

8. (a) State and prove Poynting theorem. 7.5

(b) State Maxwell's equation is phasor form. 7.5

9. Write notes on : 15

(a) Uniform plane waves

(b) Boundary conditions

B.Tech. (EE) 4th Semester F-Scheme

Examination, May-2019

ELECTRO MAGNETIC THEORY

Paper-EE-208-F

Time allowed : 3 hours] *[Maximum marks : 100*

Note : ***Question No. 1 is compulsory.*** *Attempt any* ***one*** *question from each section.*

1. (a) What is Biot - Savart's Law ? 5

   (b) What is Poisson's and Laplace Equation ? 5

   (c) Explain Faraday's Law ? 5

   (d) Derive the relation between VSWR and Reflection Coefficient. 5

Section-A

2. (a) State and prove Stock's Theorem. 10

   (b) Differentiate between irrotational field and solenoidal field. 10

3. (a) State and prove Gauss divergence theorem. 15

   (b) Give the physical interpretation of the curl of a vector. 5

Section-B

4. Explain electrostatic boundary conditions into all three components. 20

5. (a) State and explain Coulomb's Law. 10

   (b) What is relaxation time and derive the expression ? 10

Section-C

6. (a) Derive the expression for Magnetic scalar and vector potential. 10

   (b) What are Magnetic forces ? Derive the equation for magnetic forces due to magnetic field. 10

7. Derive and explain Ampere's Circuital Law with its applications. 20

Section-D

8. Explain all Maxwell's equation in differential as well as in integral form with their physical interpretation. 20

9. (a) Derive the expression for wave equation in lossless dielectric. 10

   (b) Derive the expression for basic transmission line equation. 10

B. Tech 4th Semester (AEIE) Examination,

May–2016

ELECTROMAGNETIC THEORY

Paper–EE–208 F

Time allowed : 3 hours] *[Maximum marks : 100*

Note : ***Question No. 1 is compulsory.*** *Attempt any* ***one*** *question from each section.*

1. (i) What is Laplacian of Scaler ? 5

(ii) What is Poisson's Equation ? 5

(iii) What is convention and conduction current ? 5

(iv) Explain VSWR and Reflection Coefficient. 5

Section–A

2. (a) State and prove Gauss Divergence Theorem. 15

(b) Find the constant b so that vector

$$V = \vec{i}\,(x+3y) + \vec{j}\,(y-2x) + \vec{k}\,(x+bz)$$

is Solenoidal. 5

3. Derive the Laplace Equation into all three Coordinate system. 20

Section–B

4. State and Explain Gauss Law with its applications. 20

5. (a) What is Polarization and explain Polarization in Dielectrics ? 10

(b) Derive and Explain Continuity equation 10

Section–C

6. (a) State and explain Ampere's Circuital law 10

(b) Prove that :

$$A = \frac{\mu}{4\pi} \int_v \left(\frac{J}{r}\right) dv$$ 10

7. (a) What is Biot-Savarts Law ? Explain. 10

(b) Explain Magnetic Torque and Moment with Magnetic dipole. 10

Section–D

8. (a) State and explain Maxwell's equation in differential and integral form. 10

(b) Derive the expression for wave equation in free space. 10

9. (a) Explain the Poynting Theorem with its physical interpretation. 10

(b) Derive the basic transmission line equation. 10