A **Reg. No. :** | | | | | | | | | | |

Question Paper Code: 93305

B.E. / B.Tech. DEGREE EXAMINATION, MAY 2022

Third Semester

Electrical and Electronics Engineering

19UEE305 - ELECTRO MAGNETIC FIELDS

(Regulation 2019)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. The Stoke's theorem uses which of the following operation? CO1- R

   (a) Divergence (b) Gradient (c) Curl (d) Laplacian

2. Spherical coordinate system variables, is transformed to Cartesian coordinate system then the value of y is given as _____ CO1- R

   (a) r sin θ cos φ (b)) r sin θ sin φ (c) r sin2 θ (d) r cos 2 φ

3. Coulomb is the unit of which quantity? CO2-R

   (a) Field strength (b) Charge (c) Permittivity (d) Force

4. As charge increases, what happens to flux density? CO2-U

   (a) Increases (b) Decreases (c) Remains constant (d) Becomes zero

5. Which of the following cannot be computed using the Biot Savart law? CO3- U

   (a) Magnetic field intensity (b) Magnetic flux density

   (c) Electric field intensity (d) Permeability

6. If a coil carrying current is placed in a uniform magnetic field, then CO3- U

   (a) emf is produced (b) Torque is produced

   (c) Force is produced (d) Torque and force is produced

7. What is the another name for Transformer emf CO5- U

   (a) Motional emf (b) Statically Induced emf

   (c) A combination of motional and transformer emf (d) None of the above

8. What is the major factor for determining whether a medium is free space, lossless dielectric, lossy dielectric or good conductor? CO5- U

(a) Attenuation constant (b) Constitutive parameter(σ ,ε ,μ)

(c) Loss tangent (d) Reflection coefficient

9. Electromagnetic waves are represented in which of the following format? CO5- U

(a) Longitudinal waves (b) Transverse waves

(c) Sinusoidal waves (d) Surface waves

10. Unit of Poynting Vector CO5- App

(a) Watt (b) Watt/s (c) Watt/m^2 (d) Watt/m

PART – B (5 x 2= 10 Marks)

11. Explain the terms differential length and differential surface in cylindrical coordinate system CO1-U

12. Define Electric Field Intensity CO2-U

13. State ampere circuital law CO3-U

14. Contrasts Transformer EMF and Motional EMF. CO5-U

15. Define Intrinsic Impedance CO6-U

PART – C (5 x 16= 80Marks)

16. (a) Check validity of the divergence theorem considering the field $D=xy^2\ a_x+y^3a_y+y^2zc/m^2$ and the rectangular parallelepiped formed by the planes x=0, x=1,y=0,y=1 & z=0,z=1. CO1-App (16)

Or

(b) Verify stokes theorem for the vector field $B=\rho\cos\phi\ a_\rho+\sin\phi\ a_\phi$ for the semicircle with diameter from -2 to +2 CO1-Ana (16)

17. (a) Apply Coulomb's law to determine the electric field intensity due to infinite line of uniform charged wire CO2- App (16)

Or

(b) At an interface separating conductor and free space show that the tangential component of Electric field intensity is continuous across the boundary, whereas the normal component of Electric field intensity is discontinuous at the boundary CO2- App (16)

18.	(a)	At an interface separating two different magnetic materials show that the tangential component of magnetic field intensity is continuous across the boundary, whereas the normal component of magnetic field intensity is discontinuous at the boundary	CO3- App	(16)
		Or		
	(b)	Verify ampere's circuital law for infinite long straight conductor placed along z axis. Assume amperian loop for the straight conductor	CO4- App	(16)
19.	(a)	With necessary explanation, derive the Maxwell's equation in differential and integral forms for dynamic fields	CO5- App	(16)
		Or		
	(b)	State and explain Faraday's law of electromagnetic induction and derive the expressions for statically and dynamically induced emf.	CO5- App	(16)
20.	(a)	Obtain the electromagnetic wave equation for free space in terms of electric field and explain the wave propagation with necessary parameters.	CO6- U	(16)
		Or		
	(b)	Derive an expression for pointing theorem in integral and pointing form	CO6- U	(16)

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