Question Bank- Electromagnetic fields

Topic: Review of vector analysis

1. What are scalar and vector fields? Give examples.

2. What is Divergence? Give its physical significance.

3. Write the equation of Gauss's Law in integral and differential form.

4. Define Stoke's theorem. Give its importance..

5. Give any three co ordinate systems.

6. What is physical significance of divergence of D.

7. Express the divergence of a vector in the three system of orthogonal Co-ordination.

 8. State divergence theorem.

 9. State Stoke's theorem.

10. Explain three co-ordinate system.

11. Determine the divergence of these vector fields

12. Prove that electric field intensity is negative of gradient of electric potential. .

13. Discuss applications of Gauss's Law.

14. Derive an expression for curl of a vector.

15. Define divergence, gradient, curl in spherical co-ordinate system with mathematical expression 8.

 16. The electric field in a spherical co-ordinate is given by E=(r/5)ar. Show that closed E.dS=(.E)dv.

17. State and proof divergence theorem

Topic: static electric field, capacitors, dielectrics

1. State coulombs law.

2. State Gauss law for electric fields

3. Define electric flux & electric flux density

4. Define electric field intensity

5. Name few applications of Gauss law in electrostatics

6. Define potential difference and potential.

7. Give the relation between electric field intensity and electric flux density.

8. Give the relationship between potential gradient and electric field.

9. Define current density.

10. Write down the expression for capacitance between two parallel plates.

11. State point form of ohms law.

12. Define dielectric strength.

13.. State and proof gauss law .and explain applications of gauss law.

14. Explain poissons and lapace's equations.

15. Define the potential difference and absolute potential. Give the relation between potential and field intensity.

16. Derive the boundary conditions of the normal and tangential components of electric field at the inter face of two media with different dielectrics.

17. Derive an expression for the capacitance of a parallel plate capacitor having two dielectric media.

18. Derive an expression for the capacitance of two wire transmission line.

19. Drive an expression for energy stored and energy density in electrostatic field.

20 Derive an expression for capacitance of co-axial cable.

21 List out the properties of dielectric materials.

Topic: static magnetic materials

1. State Biot –savart law.

2. State Ampere circuital law

3. Write the relation between magnetic flux density and field intensity

4. Write the relation between relative permeability and suspectibility

5. Define magnetic flux density

6. Write down the magnetic boundary conditions.

7. Give the force on a current element.

8. State Gauss law for magnetic field.

9 What is magnetic susceptibility

10. Define magnetic dipole.

11. Define magnetization. And give List of magnetic materials

12. Derive the expressions for magnetic field intensity due to finite and infinite line

13. Derive the expressions for magnetic flux intensity due to solenoid of the coil.

14. Derive the expressions for magnetic field intensity due to toroidal coil and circular coil.

15. Derive an expressions for energy stored and energy density in magnetic field.

16. Derive an expressions for self inductance of two wire transmission line.

17. Derive an expressions for force between two current carrying conductors.

18. Explain Magnetic materials and scalar and vector magnetic potentials.

19. Derive the expressions for boundary conditions in magnetic fields.

 Topic: Time varying fields and Maxwell's equations

1. State Faraday's law of induction .

2. State lenz's law

3. Give the equation of transformer emf

4. What is motional electric field and motinal emf ?

5. What are the different ways of EMF generation? Explain with the governing equations and suitable practical examples.

6. With necessary explanation, derive the Maxwell's equation in differential and integral forms .

7. What do you mean by displacement current? write down the expression for the total current density.

8. Explain the relation between field theory and circuit theory.

9. Write short notes on faradays law of electromagnetic induction.

10.. Derive General field relation for time varying electric and magnetic fields using Maxwell's' equations.

Topic: Electromagnetic Waves

1. Define a Wave.

2. Mention the properties of uniform plane wave.

3. Write down the wave equation for E and H in free space.

4. Write down the wave equation for E and H in a conducting medium

5. Define intrinsic impedance or characteristic impedance.

6. Calculate the characteristic impedance of free space.

7. Define propagation constant.

8. Define skin depth.

9. Define Pointing vector.

10. State Poynting Theorem.

11. What is lossy dielectric medium?

12. Define Polarization.

13. Define Circular Polarization.

14. Define Elliptical polarization.

15. Define Linear Polarization.

16. Derive the one dimensional general wave equation and find the solution for wave equation.

17. Discuss about the plane waves in lossy dielectrics.

18. Discuss about the plane waves in lossless dielectrics. 7. Derive wave equation in phasor form .

19. Derive suitable relations for integral and point forms of poynting theorem.