

SATHYABAMA UNIVERSITY

(Established under section 3 of UGC Act, 1956)

Course & Branch: B.E. – ECE/ETCE/E&C

Title of the paper: Engineering Electromagnetics/Electromagnetic Field Theory

Semester: III

Max. Marks: 80

Sub.Code: 13304/25304/17304 (2002/2003/2004/2005) Time: 3 Hours

Date: 18-04-2007

Session: AN

PART – A

(10 x 2 = 20)

Answer ALL the Questions

1. Transform a point from Rectangular to Cylinder and Rectangular to Spherical Coordinate.
2. State Coulomb's Law.
3. Write Laplace Equation and its application
4. Write the equation in point form for Ohm's law
5. State Biot Savarat Law.
6. Define the term Magnetic moment and Magnetic Permeability
7. Write the Maxwell's equation in point form.
8. State Faraday's law of Electromagnetic induction with a mathematical expression.
9. Define the term intrinsic impedance of free space with its value
10. What is Polarization?

PART – B

(5 x 12 = 60)

Answer All the Questions

11. (a) Define Divergence and Curl. Explain their significance.
(b) Verify the Curl Equation. Given $H=0.2 Z^2 a_x$ for $Z > 0$ $H=0$ elsewhere. If the path of integration is around a square with side (d) centered at $(0,0,Z)$ in the $y=0$ plane, when $Z > 2d$.

(or)

12. State the principle of superposition as applied to electric potential and derive a general expression for the resultant potential due to point, line, surface and volume charges composing the systems.
13. Conducting Spherical shells with radii $a=10\text{cm}$ and $b=30\text{cm}$ are maintained at a potential difference of 100V such that $V(r=b)=0$ and $V(r=a)=100\text{V}$. Determine V and \vec{E} in the region between the shells.

(or)

14. State and derive the expression for Poisson Equation.
15. Find the magnetic flux density around infinitely long straight conductor by magnetic vector potential.
16. A rectangular loop (8×4)m, carrying 10A is placed on $Z = 0$ plane. Find the field intensity at $(4,2,0)\text{m}$.
17. Derive an expression for the energy stored in the magnetic field of a coil possessing an inductance of L Henry when the current in the coil is I amps.

(or)

18. From the fundamental law obtain Maxwell equation in integral form and convert them into Differential form.
19. Explain the wave equation in free space.

(or)

20. Define Poynting Vector. State and prove Poynting Theorem.