

ANNA UNIVERSITY COIMBATORE
B.E. / B.TECH. DEGREE EXAMINATIONS : MAY / JUNE 2010

REGULATIONS : 2007

THIRD SEMESTER : EEE

070280010 - ELECTROMAGNETIC THEORY

TIME : 3 Hours

Max.Marks : 100

PART – A

(20 x 2 = 40 MARKS)

ANSWER ALL QUESTIONS

1. Define curl of vector function.
2. State Stoke's theorem.
3. What is the physical significance of the term "divergence of a vector field"?
4. List out three properties of electric flux lines.
5. State the relation between electric field intensity and potential gradient.
6. Define electric dipole and dipole moment.
7. Give formula for electric potential due to a point charge.
8. State divergence theorem
9. Write down the formula for conduction current density and displacement current density.
10. State Laplace equation and Poisson's equation.
11. Write down expression for capacitance of two conductor overhead transmission line.
12. Mention the two classes of dielectric materials.
13. State Ampere's circuital law.
14. Calculate the force experienced per kilometre length by two long parallel conductors carrying direct current of 10A in the same direction. The perpendicular distance between the conductors 1m. Medium is air. State the direction of force.

15. Two inductors of 1H and 2H are connected in series. What is the effective inductance?
16. Distinguish magnetic scalar potential and magnetic vector potential.
17. State some similarities between electric circuits and magnetic circuits.
18. What do you mean by "depth of penetration"?
19. Define Poynting vector.
20. State wave equation in phasor form.

PART – B

(5 x 12 = 60 MARKS)

ANSWER ANY FIVE QUESTIONS

21. (i) Use the cylindrical coordinate system to find the area of the curved surface of a right circular cylinder where $r = 20$ m, $h = 5$ m and $30^\circ \leq \phi \leq 120^\circ$. 6
(ii) State and explain Divergence theorem. 6
22. A circular disc of radius 'a', m is charged uniformly with a charge density of σ C/m² Find the electric field intensity at a point 'h', m from the disc along its axis.
23. State and explain Gauss's law. Derive an expression for the potential at a point outside a hollow sphere having a uniform charge density.
24. (i) Two point charges $Q_1 = 4nC$, $Q = 2nC$ are kept at (2, 0, 0) and (6, 0, 0). Express the electric field at (4, -1, 2). 6
(ii) Write short notes about dielectric materials. 6

25. A capacitor consists of squared two metal plates each 100 cm side placed parallel and 2 mm apart. The space between the plates is filled with a dielectric having a relative permittivity of 3.5. A potential drop of 500 V is maintained between the plates.

Calculate

- i. the capacitance
 - ii. the charge of capacitor
 - iii. the electric flux density
 - iv. the potential gradient
26. State and explain Biot – Savart's law.
27. Derive the expression for inductance of toriod.
28. Derive Poynting theorem.

*****THE END*****